THE GATE HOUSE.

MISSOURI

BOTANICAL GARDEN.

FOURTH ANNUAL REPORT.

ST. LOUIS, MO.:
PUBLISHED BY THE BOARD OF TRUSTEES.
1893.

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* *Ex-officio.*

[1] Elected April 9th, 1890, to fill the vacancy caused by the resignation of Judge Samuel Treat, one of the Trustees named by Mr. Shaw.

[2] Elected December 18th, 1889, to fill the vacancy caused by the resignation of M. Dwight Collier, one of the Trustees named by Mr. Shaw, but who had removed from the city.

[3] Elected President of the School Board November 8th, 1892, in place of Richard Bartholdt, who met with the Board for a year prior to that date.

[4] Elected Chancellor of Washington University October 16th, 1891, up to which time the office had been vacant, since the organization of the Board.

[5] Elected President of the Academy of Science January 4th, 1892, in place of F. E. Nipher, who had met with the Board until that date.

YUCCA GUATEMALENSIS.

PREFACE.

Under direction of the Board of Trustees, the fourth annual report of the Missouri Botanical Garden is presented to the public. The first volume of the series was issued in December, 1890, the second in May, 1891, and the third in June, 1892. Reprints of scientific papers, fixing the date of publication of the latter, were issued as follows: Trelease, North American Species of Epilobium, April 22, 1891; Trelease, North American Species of Rumex, April 12, 1892; Riley, the Yucca Moth and Yucca Pollination, May 28, 1892; Williams, Fruiting of Parmelia molliuscula, May 28, 1892; Trelease, Detail illustrations of Yucca, and description of Agave Engelmanni, May 28, 1892.

The reports of the Garden are sent regularly to scientific institutions and journals in exchange for publications desirable for the work of the Garden, and so far as is possible reprints of the botanical articles which they contain are sent to botanists to whom these papers are directly useful in their work. For the accommodation of persons who may desire the publications of the Garden but feel that they are not entitled to receive them by way of exchange or as aids to scientific work, a few copies are offered for sale at about the cost of publication ($1.00 each for reports, and 50 cents each for the larger reprints), by Dr. A. E. Foote, of Philadelphia, W. Wesley & Son, of London, and R. Friedländer & Sohn, of Berlin. Application for the exchange of either reports or separate papers may be made to the Director of the Garden.

WILLIAM TRELEASE.

St. Louis, Jan. 12, 1893.

YUCCA GUATEMALENSIS.

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YUCCA SCHOTTII.

REPORTS FOR THE YEAR 1892.

REPORT OF THE OFFICERS OF THE BOARD.

SUBMITTED TO THE TRUSTEES, JAN. 11TH, 1893.

To the Board of Trustees of the Missouri Botanical Garden:

The financial results of the year just closed have been entirely satisfactory and the estimate made for the probable income has been exceeded notwithstanding there were a number of vacant buildings at the last report, which were, however, rented during the year, and the expenditures were less, with the exception of two accounts, than the estimates.

During the past year no extensive improvements have been undertaken at the Garden, but the liberal appropriations made for its maintenance have been judiciously expended, as its appearance during the past summer indicated, and for a more extensive notice of the work done you are referred to the report of the Director of the Garden.

Notwithstanding the fact that the condition of the revenue property has been well kept up, and in some cases improved, the Garden fully provided for, all of Mr. Shaw's wishes carried out, and the taxes paid, all out of the revenue for the year, we are able to show a surplus of $17,636.50, which, with that on January 1, 1892, makes a total of $23,561.59.

The property of the Board in the business portions of the city, is, with one or two exceptions, now occupied at fair rentals, some in excess of last year, and our income for next year should be at least 10 per cent. greater than last.

The Director of the Garden was instructed by the Board to make a careful inventory of the Library and Herbarium

at the Garden, which has just been completed with the following results: —

Library, 11,455 books and pamphlets	$21,150 00
Herbarium, 203,000 sheets of specimens	20,300 00
Furniture, cases, etc.	3,000 00
Total	$44,450 00

which amount has been credited to the stock account of the Board, which now aggregates $1,467,713.53.

For a full and detailed statement of the receipts and expenditures you are referred to the following pages.

RECEIPTS.

Rents collected in 1892	$89,079 27	
Garden, pasturage and sales	1,079 13	
Interest, cash discount on taxes	414 50	90,572 90
Cash Balance on January 1, 1892		8,258 07
Total		$98,830 97

EXPENDITURES.

Garden Expenses -		
Labor, including pupils	$16,582 92	
Fuel	1,148 29	
Stable and implements	802 00	
Repairs and supplies	2,839 32	
Scholarship, care of lodge	445 87	
Plants and seeds	736 43	
Herbarium	502 07	
Library, books and subscriptions	1,602 78	
Garden Office, salaries, etc	5,446 50	$30,106 18
Garden Improvements —		
Furnishing Library, etc		2,806 06
Publications		1,820 61
Property expenses —		
Commission	3,247 32	
Taxes	22,167 36	
Insurance	1,853 45	
Repairs	5,347 46	32,615 59
Sundry accounts —		
Office salaries	2,500 00	
Rent of office	540 00	
Printing and stationery	415 56	3,455 56
Legal expenses		242 15
Bequests, annual —		
Flower show, premiums	387 60	
Flower sermon	200 00	
Trustees' banquet	906 25	
Gardeners' banquet	397 00	1,890 25
		$72,936 40
Cash on hand		25,894 57
		$98,830 97

Financial condition —	
Cash on hand and in bank	$25,894 57
Less amount due stock account, etc	2,332 98
Surplus	$23,561 59

The books of the Board have been closed after showing the operations for the year ending December 31st, 1892, and the receipts have been disposed of as follows:—

Rent account		$89,079 27
Interest		414 50
		$89,493 77

CONTRA.

Garden expense	$29,027 05	
Garden improvements	2,806 06	
Publications	1,820 61	
Commissions	3,247 32	
Taxes	22,167 36	
Insurance	1,853 45	
Repairs	5,347 46	
Office expense	3,455 56	
Legal expense	242 15	
Annual flower show	387 00	
" " sermon	200 00	
" Trustees' banquet	906 25	
" Gardeners' dinner	397 00	
Surplus for 1892	17,636 50	
	$89,493 77	$89,493 77

Surplus January 1, 1892	$5,925 09
" for 1892	17,636 50
Total surplus January 1, 1893	$23,561 59

Respectfully submitted,

R. J. LACKLAND, *President.*

Attest,
A. D. CUNNINGHAM, *Secretary.*

YUCCA AUSTRALIS.

FOURTH ANNUAL REPORT OF THE DIRECTOR.

SUBMITTED TO THE TRUSTEES JAN. 11, 1893.

To the Board of Trustees of the Missouri Botanical Garden:

The following report on the Missouri Botanical Garden and the Henry Shaw School of Botany is respectfully submitted, in compliance with the rules of the Board.

THE BOTANICAL GARDEN.

It is gratifying to me to be able to report that the number of visitors to the grounds through the past year has been considerably increased as compared with preceding years, and, so far as could be gathered from their remarks, they have shown an appreciation of the improvements which have been made, and especially the more natural grouping of the plants and the addition of large specimen cacti, yuccas, etc., from the arid regions. On the open Sunday in June about 16,000 visitors were counted; but on the open Sunday in September only about 4,650 persons visited the Garden, owing to rains through the greater part of the afternoon. As in former years, the visitors on these holidays have been orderly and for the most part unusually appreciative of the attractions of the Garden.

A marked improvement has been made this year in opening up the eastern side of the garden proper, which has been densely shaded heretofore by overgrown shrubbery. This has permitted the conversion of a large tract of bare ground into lawn. The decorative plants, which have been increased considerably in number notwithstanding this seeming extension of the lawn area, have been grouped in clusters instead of being arranged as heretofore in long monotonous rows of a single species. The number of species in cultivation has been greatly increased, chiefly through the liberality of various botanical gardens, from

which some 1,475 packets of seeds and 100 living plants have been received. About 3,025 packets of seeds of our own collection have been distributed to these and other institutions to which the Garden stood indebted. A considerable number of purchases have been made, also, and I was able to secure from the dry district of Texas, Arizona and California a number of representatives of the more characteristic yuccas, agaves and cacti of those regions.

The average number of gardeners and laborers employed has been 42, and the pay-roll for the year amounts to $16,582.92. While the number of improvements undertaken in 1892 is not as large as in 1890 and 1891, considerable advance has been made in this direction. These improvements have been reported in detail in my reports to the Board each month, but by way of summary it may be said here that about 500 lineal feet of granitoid walk was laid in front of the new Herbarium Building on Tower Grove avenue, and the ground about the building and along this walk was suitably graded and seeded to grass or sodded; about 4,600 square feet of sod was laid and some 4,200 square feet of ground spaded and seeded to lawn grass; about 1,800 running feet of drain and conduit pipe was laid, and the necessary surface connections made; 5,900 square feet of walk was substantially made, most of it consisting of very old walks of defective construction; about 6,000 running feet of brick edging was relaid along the walks; some 2,000 running feet of board fence was rebuilt about the pasture; two small rockeries were built near the Linnean House; and a new boiler has been placed for the Succulent House. Repairs of considerable extent have been made on the greenhouses, the farm-house, and the Lodge. Several hundred additional metallic tree labels with raised letters have been placed, and several thousand celluloid labels, marked with indelible ink, have been brought into use in the greenhouses and elsewhere, those used in the wild garden being wired to long iron rods thrust deeply into the soil, beyond danger of displacement

by frost, while those used in the flower-pots are fastened by Megill clasps to flat strips of galvanized iron, which do not turn so easily as the round rods.

About 65 specimen plants, which could be spared from the greenhouses, were loaned in the fall to the Missouri commissioners for exhibition at the Columbian Exposition. The surplus bedding plants when the borders were cleared in autumn, were in part distributed among the hospitals and poorer homes of the city, and I wish to express my especial gratitude to the Ladies' Flower Mission and the management of the Bethel for their kind co-operation in the distribution of about 1,000 such plants.

The additions to the herbarium have consisted in the current American collections, about 3,000 duplicates from the herbarium of the late John Ball, and a set of some 1,200 New Zealand plants, purchased; and a set of the valuable Exsiccatæ of the Austrian Flora, donated by the Vienna Museum, besides many smaller collections and single specimens presented by correspondents, to whom the thanks of the Garden are extended. The herbarium, as now arranged, is composed as follows: —

The George Engelmann herbarium.....	about 98,000	specimens.
The general herbarium of higher plants		
The Bernhardi herbarium.....	about 57,500	
Other specimens.....	" 31,500	
	89,000	"
The collection of Thallophytes.....	about 16,000	"

Making a total of about 203,000 specimens.

It has not been found practicable to add to the library as freely as I could have wished, but during the year about $1,427.00 has been spent for purchases and binding. A much needed card index to the species of plants described and figured in works at the Garden has been begun, and one assistant, Mr. J. C. Bay, is employed for this work. The large collection of pamphlets has been protected from injury and rendered readily accessible by inclosing each in a neat pasteboard cover with cloth back, resembling a thin

book cover, the name being written on a white label pasted near the top on the front of the cover. This plan, which I first saw in use in the Department of Agriculture at Washington, has commended itself to me as the best method of preserving pamphlets, each of which is stitched to muslin strips fastened to the inside of the binder; and the cost, $4.00 per hundred covers, is not disproportionate to the money value of the pamphlet, which is usually small in comparison with its scientific usefulness. Each pamphlet in its binder is placed on the shelves of the library, in its proper relation to larger volumes treating of subjects similar to its own, the arrangement of the whole being according to subjects, and the books being distributed through the building so as to be most convenient with reference to the herbarium. An enumeration of the present contents of the library shows: —

5,225 books, appraised at.....	$19,300 00
6,230 pamphlets, appraised at.....	1,850 00
Giving a total valuation of	$21,150 00

In the latter part of October, Dr. Sturtevant, whose gift of *Capsicum* material and notes is referred to below, wrote me that he desired to make a further donation to the Garden of his entire botanical library, including the scrap books of his own writings and his manuscript notes on edible plants, stating that he should wish to retain the books during his life, or so long as he might have occasion to use them, but asking me to take the necessary steps to secure a formal transfer of ownership at once. The library presented in this manner by Dr. Sturtevant is undoubtedly the most complete and valuable American collection of pre-Linnæan botanical books, and represents the expenditure of a great amount of time and money on his part, since he has for many years been interested in bringing together the early literature of the science, especially in its application to economic plants. In accepting this generous and quite unsolicited gift, the Board of Trustees of the Garden at

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their November meeting expressed their appreciation of its value and of the spirit in which it was tendered, and voted that on its actual receipt at the Garden it should be arranged, together with other works published prior to the time of Linnæus, in a separate alcove, the whole to be known as the E. Lewis Sturtevant library of pre-Linnæan botany. Whenever this alcove shall be opened, a catalogue of its contents will be published, in order that students of botany may know where a collection of books of this character can be consulted.

Horticultural work was carried on efficiently by Mr. J. C. Duffey, up to the time of his death on the third of December, and I cannot speak in terms of too warm appreciation of his interest in the development of his department and the success of the course of study for garden pupils, in whose instruction he took an important part. Mr. Duffey also had maintained very pleasant relations for the Garden with the St. Louis Florists' Club and the State Horticultural Society. At the time of his death he had in hand several pieces of work on fungi and insects, some of which it may be found practicable to complete in the future.

Mr. A. S. Hitchcock, for two years my principal assistant in botany, severed his connection with the Garden about the beginning of the year, to accept a professorship in the Kansas Agricultural College. His work was continued temporarily through the winter months by Mr. T. A. Williams, of the South Dakota Agricultural College, and the vacancy was filled in March by the appointment of Mr. F. W. Dewart.

In the early part of the year, Dr. E. Lewis Sturtevant donated to the Garden his extensive and valuable collection of specimens, manuscript and illustrations, largely in color, of the genus *Capsicum*, on condition that the genus should be studied with reference to an ultimate monograph of the wild and cultivated forms. On accepting this generous gift, I at once procured seeds of all obtainable varieties, and about 125 named sorts were cultivated by Mr. Duffey, and

made the subject of study through the season by Mr. Dewart; and it is proposed to continue the work through 1893 and as much longer as may be necessary. With the sanction and aid of the Board, I was enabled to spend the greater part of the spring months in Texas, Arizona, and California, in a study of the pollination of the Yuccas, and a paper embodying the results of my observations will appear in the Fourth Report of the Garden.

In order to obtain facilities not in its possession for the study of marine botany, and with a view to promoting such study, the Board this year authorized the Director to subscribe for the present $100.00 annually, for a botanical research room in the Marine Biological Laboratory at Wood's Holl, Mass., on condition that it should be actually used each year for botanical work. It is not probable that a member of the Garden staff can regularly make use of the facilities secured in this way, and when this cannot be done the Director is desirous of having the room used by some competent botanist not connected with the Garden, and invites correspondence early in each year from professors or others who may wish to study our marine flora. The only conditions imposed in such allotment of the room are that it shall be used exclusively for botanical work, and that in the publication of any results obtained the Garden shall receive credit for the facilities offered; but the Director would wish, if good reason to the contrary does not exist, to have the results of any important research published in the reports of the Garden. During the season of 1892, the room was used by Mr. M. A. Brannon, who was occupied with a study of *Grinnellia Americana*.

In March last three vacancies among the Garden pupils were filled, in accordance with an announcement issued in the preceding November. One of the scholarships was given to a nominee of the St. Louis Florists' Club, and the other two were awarded on the results of competitive examination. The young men who received these scholarships have applied themselves to their work through the year with

commendable interest. Subsequently to the filling of these vacancies, one of the original appointees of 1890 resigned his scholarship through lack of interest in his work, and an announcement was issued in November stating that the vacancy will be filled in March next, on the result of examinations.

An important addition to the conveniences of the Lodge has been made by providing hot water for the bath room. The gardening and other horticultural periodicals taken at the Garden are carried to the Lodge on their receipt, and allowed to remain on file in the reading room for a reasonable time, after which they are returned to the Garden library. In addition to these current numbers of journals, the reading room contains a reference library of about 75 volumes relating to practical gardening.

When the course of study for garden pupils was outlined, three years ago, provision was made for carrying it through six years if necessary, in order that the subjects it was desired to teach might receive ample attention. It was evident to me at the time that the course was much longer than was desirable, and I hoped to be able to shorten it considerably after testing practically the time needed for the several studies. Such a test has been made now, and on the 9th of March last the original resolution of the Board * was modified in such a manner as to shorten the course to four years, without omitting any of the manual work or any of the studies originally included. Vacations have now been fixed so as to comprise the first two weeks in July, and two weeks extending from the 21st of December to the 4th of January, inclusive.

In its present form the work of the scholarship course is divided as follows. All of the first year is given to manual work, as is half of each day during the remaining three years. The other half of the last three years is

* Report, 1890, p. 94.

given to studies, distributed as is shown in the annexed schedule.

COURSE OF STUDY.

YEAR.	TERM.	STUDIES.						PER WEEK.
SECOND.	April to June.	Floriculture, 3 exercises weekly.			Surveying 1 exercise weekly.	Drainage, 2 exercises weekly.		6
	July to Sept.	Floriculture, 3		Small Fruit Culture, 3				6
	Oct. to Dec.	Floriculture, 1	Elementary Botany, 2	Orchard Culture, 2	Surveying, 1			6
	Jan. to Mar.	Floriculture, 1	Elementary Botany, 2	Orchard Culture, 1	Surveying, 1	Botany of Weeds, 1		6
THIRD.	April to June	Vegetable Gardening 4	Botany of Vegetables 1	Landscape Gardening 1				6
	July to Sept.		Botany of Fruits, 1	Landscape Gardening 1	Fungi, 3	Book-Keeping, 1		6
	Oct. to Dec.		Botany of Trees and Shrubs, 2		Fungi, 3	Book-Keeping, 1		6
	Jan. to Mar.		Twigs of Woody Plants, 1	Landscape Gardening 1	Fungi, 2	Book-Keeping, 2		6
FOURTH.	April to June	Economic Entomology, 1	Botany of Ferns, 2		Special Theoretic'l Gardening 2	Garden Accounts, 1		6
	July to Sept.	Economic Entomology, 2	Botany of Garden Flowers, 2	Forestry, 2				6
	Oct. to Dec.	Economic Entomology, 2	Botany of House Plants, 2	Forestry, 1	Vegetable Physiology 1			6
	Jan. to Mar.	Special Theoretic'l Gardening 2		Forestry, Seeds and Seedlings, 1	Vegetable Physiology 2	Garden Accounts, 1		6

Of the 72 weekly exercises (each for three months) there shown, 20 are given to gardening proper, inclusive of fruit culture, 9 to surveying, drainage and landscape gardening, 6 to book-keeping, 7 to economic entomology, 5 to forestry, and 25 to botany, in its strictest applications to gardening. All of the studies capable of being so taught are taught in

YUCCA BREVIFOLIA.

the laboratory, and all of the theoretical instruction is expected to be practically tested in the performance of the manual work required of students.

Four annual events provided for under the will of Henry Shaw have taken place in the course of the year, namely: the delivery of the third flower sermon, in Christ Church Cathedral, by Rev. Cameron Mann, of Kansas City; the third banquet to the Trustees of the Garden and their guests, presided over by the Chancellor of Washington University; the third banquet to gardeners, florists and nurserymen, presided over by the Director of the Garden; and the award of the second series of Shaw premiums at a floral exhibition, given under the management of the Florists' Club of St. Louis.

The flower sermon will be printed in the Fourth Report of the Garden, which will include also abstracts of the proceedings at the two banquets. The Shaw premiums were offered for the same class of plants as in 1891.* Competition was not made for several of them, but the following awards were recommended by the officers of the Florists' Club and approved by the Board of Trustees: Chrysanthemums (including a new seedling of decided merit), $97.00; Orchids, $20.00; Palms, $132.00; Ferns, $38.00; Oxalis, $8.00; Crotons, Cannas, and decorative plants other than the above, $92.00. The seedling Chrysanthemum which received the Shaw premium in 1891 was exhibited under the name Mrs. E. D. Adams, by Pitcher and Manda. That of 1892, named for President W. R. Smith (of the Society of American Florists), was exhibited by E. G. Hill.

The School of Botany.

Until the end of the college year 1891–2, Mr. H. J. Webber continued to act as my assistant at the School of Botany, performing duties similar to those of the preced-

* See Third Report, p. 18.

ing year, and he spent the greater part of the summer vacation at the School, engaged in scientific work. In the early part of September he resigned his position to accept a more responsible one in the sub-tropical laboratory established at Eustis, Fla., by the United States Department of Agriculture. Since the opening of the present college year I have been assisted by Mr. Jared G. Smith, whose duties are similar to those performed by Mr. Webber. Up to the present fall the position has been that of assistant, and the appointment was made by me, in consultation with the Chancellor of the University; but it has been changed this year to an instructorship in Washington University, and the appointment is made by the Board of Directors of the University, though the duties and salary of the appointee remain the same as heretofore.

Though the endowment property of the School is regaining some of its original value, lost through the depreciation of the neighborhood in which it is situated, the income of the School is still too small to allow any considerable addition or extension to be made, and only the books and material needed for immediate use have been purchased. Owing to causes which have been stated in a previous report,* the number of special students in the School of Botany remains about the same as in previous years, but in addition to the instruction of undergraduates in the University, and garden pupils, special classes have been carried on as follows: In the spring of 1892, special phænogamic botany, structural botany, histology, and ferns. In the fall of 1892, special systematic botany, bryophytes, and thallophytes. For the first time since the establishment of the School, I have been able to secure several undergraduate engineering students for a study of the histological and other means of distinguishing timbers, and the adoption of an elective system by the Faculty of the University promises to give more opportunity for botanical instruc-

* Report 1890, p. 100.

tion than has been possible under the previous arrangement of the undergraduate courses. During the year one contribution has been published from the School, a supplement to the catalogue of Nebraska plants, by Mr. Webber.

As heretofore, the facilities at the Garden and School of Botany have been utilized by visiting botanists, and an effort is made to assist competent students and investigators in every possible manner.

Respectfully submitted,

WILLIAM TRELEASE,
Director.

St. Louis, Mo., Jan. 11, 1893.

YUCCA BREVIFOLIA.

ANNIVERSARY PUBLICATIONS.

THIRD ANNUAL FLOWER SERMON.

BY THE REVEREND CAMERON MANN.

Consider the lilies of the field * * * even Solomon in all his glory was not arrayed like one of these.—ST. MATTHEW, vi, 28, 29.

When our Lord thus spoke, He was not pointing to any single species or order of plants, but indicated all that tapestry, woven in tulips and crowfoots and anemones, "innumerable of stains and splendid dyes," which stretched out from His feet to the farthest eyesight as He sat teaching on the mount.

"Shoshannim," the shining ones, was the title under which the common speech of Galilee grouped them all, and which our English Bible, following the Latin version and the Greek original, aptly renders by lilies, "the plants and flowers of light."

What the text invites us to, and what I, speaking, as directed this morning, upon "the wisdom and goodness of God as shown in the growth of flowers," shall try to elicit some spiritual lesson from, is the whole blossoming of the year, from the pink flush of the trailing arbutus, breathing faint fragrance by drifts of belated snow, to those final gleams sent by the weird witch-hazels through the swirl of falling leaves.

What a wealth of loveliness it is which marches across the landscape in the annual procession of the flowers! What glad audacities and subtle harmonies of color, what racy mouldings and delicate carvings of form,—vivid splendors of scarlet and gold, sweet solemnities of azure and purple, restful interludes of brown and green,— blossoms rising in spikes like crocketed spires or diffuse as a swarm of butterflies; corollas plicated, convoluted, contorted,

fretted and fringed; star-shaped, bell-shaped, salver-shaped, trumpet-shaped; silken banners of iris, bossy targes of helianthus!

And this wealth is so lavishly showered. Even into the alleys and waste lots of our cities come some gracious presences; and it is easy for most of us to reach those woods and streams whence we may return laden with memories of sweetness and beauty.

All of us I trust have such memories, for no life is complete without them. He has greatly lost who never saw the harebells nodding from the cliffs, or the fleet of lily-pads with their white chalices floating on the lake, or the great moccasons standing regal in the peat-bog while gold-threads and sundews glimmer humbly below.

The productions of garden and greenhouse are indeed not to be scorned; however we may trace human ingenuity in their doublings and markings yet

> Nature is made better by no mean
> But nature makes that mean; so o'er that art
> Which you say adds to nature, is an art
> That nature makes.

But after all we come closest to the plants when we behold them in their self-chosen environment,—the cacti, sprawling in cylinders or rolling in globes over arid wastes, the azaleas belting the swamps with blazing hedges, the oxeye daisies and the buttercups swaying on the billows of the meadow grass. It was over a self-sown countryside that our Lord gazed when He said "Consider the lilies."

It has been remarked that "this word of Jesus is almost the only tender word about flowers in all the Bible." Which is the more surprising because the flora of Palestine is abundant and attractive. A tourist describes the Plain of Esdraelon as "here, a flaming mass of red anemones, there golden and yellow with myriad nodding daisies; farther on a sheet of burning azure in the sun." Yet throughout the Hebrew books we search in vain for

any keen recognition of the sweetness and charm of the lilies of the field. But the same can be said, though not quite so sweepingly, of all the ancient literatures, of the classics of Greece and Rome as well as of Judea.

There were gardens and festal wreaths and dryad-myths and altars to Chloris; but not in Homer nor in Euripides, nor in Horace nor in Virgil, will you come on any such hearty love of flowers, such tenderness and interest, as the modern poets display, the Italians, the Germans, the French, and pre-eminently the English. And it should be distinctly noted that it is not the feebler bards, those unable to treat mightier themes, who chant the flower song. For us it begins with that stout man of the world, Geoffrey Chaucer, who says when

> The moneth of May
> Is comen, and that I hear the fowles synge
> And that the flowers gynnen for to sprynge
> Farewel my book and my devocion.

The shrewd critic who drew the Wife of Bath and the Sergeaunt of Laws, the noble sage who drew the Knight and the Parson, goes into raptures over the common daisy, crying

> I love it and evere ylike newe,
> And ever shal til that myn herte dye.

Need I remind you of the kingcups and gilliflowers and coronations in Spenser's "Shepherds' Calendar?" or how Milton calls, with discriminating adjectives that prove the scholar of wood and field, for pansies and cowslips and woodbines to strew the hearse of Lycidas? And then there is Herrick with his hands full of daffodills; and George Herbert with brave bunches of roses; Goldsmith and Cowper culling from hedgerows and village gardens; Burns observant of each weed turned under by his plowshare; Wordsworth the laureate of the humbler blossoms; Scott and Shelley and Keats; in these days Browning, whose botany whether English, Italian or French, is profuse

and accurate, and Tennyson who has hung on many a plant "jewels five-words-long" of exquisite epithet. And to name apart him who soars in supreme dominion over all English verse, William Shakespeare, we find that he holds the mirror up to vegetable as well as human nature, and with the same felicity. Not even the difference between the upper and under surface of a leaf escapes him. Ophelia is drowned where

> A willow grows aslant the brook
> That shows his *hoar* leaves in the glassy stream.

And the play composed in the serene maturity of his genius, The Winter's Tale, contains the most marvelous bit of poetic botany ever written, a description of some familiar Warwickshire flowers as intense and lucid as are his portraits of Rosalind and Imogen. Perdita gives the very essence of the plant in its relations to human hearts when she speaks of

> daffodills
> That come before the swallow dares, and take
> The winds of March with beauty; violets dim,
> But sweeter than the lids of Juno's eyes
> Or Cytherea's breath.

It is no sentimentality of some age or school, this flower-song of the English poets. Our literature is like a mediæval manuscript where spray and blossom twine into and help make up the text. The lightest fancy may perch upon some gay corolla, or the meanest flower that blows may give thoughts that lie too deep for tears.

Crossing the Atlantic makes no change. The verse of Bryant and Lowell, the prose of Thoreau and Burroughs and Gibson are enough to prove that the love of the lilies is in American as well as English literature.

Let me remind you of another characteristic of this literature, written on both sides the sea; it is, take it for all in all, the most Christian ever known. Not that it is most prolific in manuals of devotion, not that it leads in exegetics or dogmatics, — it has no Summa Theologica, no Imitatio

Christi. But in all its forms, in drama, in epic, in lyric, in novel, in essay, it is most evidently the utterance of men who were bred in the religion of Jesus Christ, who are familiar with creed and prayer and sacrament, who have "with holy bell been knoll'd to church," and whose common speech is saturated with Bible imagery and diction. And it is, I verily believe, to this Christian sentiment so dominant in our classics that we owe their fondness for grass and trees and flowers, their sympathy with the gentler aspects of nature, their readiness

> To learn not only by a comet's rush
> But a rose's birth, not by the grandeur God —
> But the comfort, Christ.

There are sermons in sea and sky and mountain range: for everything preaches to one who will listen; and so there are sermons in flowers, and this sermon is oftenest set to lovely music, is a hymn of praise and joy. And for the beginning of reverent attention to it we must go back to the One who spoke its text: "Consider the lilies of the field."

What is it we may learn from such considering, what is the great lesson of the lilies? You all know Tennyson's lines —

> Flower in the crannied wall,
> I pluck you out of the crannies,
> I hold you here, root and all, in my hand,
> Little flower, but if I could understand
> What you are, root and all, and all in all,
> I should know what God and man is.

This is perfectly true; but the same is true of the stone in the wall where the flower grows, or of the slug crawling over its leaf. One fact does, in the last analysis, mean all other facts; one flower requires the universe. But so does one pebble, one worm; no matter on what bit of reality we take our stand, we stare off into infinity. What, therefore, is a teaching of all things cannot be the distinctive teaching of the flowers.

The botanists have amassed an enormous store of information about plants, their structure, their functions, their distribution. Watched through the microscope in all the mutations of growth and reproduction and recorded in each versatile adaptation to the changes of their surroundings, these lilies of the field furnish exhaustless opportunities for modern students.

But, of course, to the Galileans who first heard the Sermon on the Mount, the material so abundantly provided by the histologists and physiologists and palæontologists was unknown. Yet so far as the principles, the basic facts for reasoning, are concerned, those Galileans were not much inferior to ourselves when they came to study the chief lesson of the flowers.

True, we have been shown a thousand conformations of a plant to its circumstances where they knew only one; but that one settled the question. We see quaint markings, "bands, checks, spots, reticulations, grooves, punctures" in pollen grains not visible to the naked eye; but there were plenty of shapes and shadings for any one to look at two thousand years ago. We have discovered groups of fairy-like structures in the slime of ponds; but Peter and John could behold the grace and verdure of a countryside.

After all, modern science has only enormously multiplied the examples, and continued the rules of our immediate vicinity into both those infinities which we scan through our optic glasses,— it is matter and force and order everywhere. Consider the stars, consider the diatoms, consider the lilies,— it is all the same; only the stars are far away, the diatoms are difficult to discern, but the lilies are near and conspicuous. We do not need telescope or microscope to find the main facts of the universe.

> Wonder and beauty our own courtiers are,
> Pressing to catch our gaze,
> And out of obvious ways
> Ne'er wandering far.

The lessons of the lilies are for all; it was to common-folk long ago that Christ commended them. And the first, the plainest, the most important teaching of flowers is their teaching of beauty. It was this our Lord had in mind: "Consider the lilies; Solomon in all his glory was not arrayed like one of these."

Speaking as Jesus did to believers in a Personal Deity, He argued from the care shown for the grass of the field to the care that must be exercised over men and women; human life cannot be squalid and ugly by the will of One who has written His choice of grace and sweetness on the plants that live but a day. It is, therefore, to this great fact of beauty, with its implication and revelation of a Divine Mind, that I ask your attention.

Let no one sneer at such study of nature as superficial, unworthy of a scientific age. For science must recognize *all* the facts, and to us the most obvious fact about a large part of nature is that it is beautiful. The gratification we get in dissecting a crocus is no more real than the gratification we get in seeing it smile up from the sward.

"Yesterday," says Darwin, in a letter to a friend, "I strolled for an hour and enjoyed myself,—the fresh yet dark green of the grand Scotch firs, the brown of the catkins on the old birches with their white stems, and a fringe of distant green from the larches made an excessively pretty view. At last I fell asleep on the grass and awoke with a chorus of birds singing around me, and squirrels running up the trees and some woodpeckers laughing, and it was as pleasant and rural a scene as ever I saw, and I did not care one penny how any of the beasts or birds had been formed."

I take it the great man of science evinced quite as lofty a mind thus lying on the grass and contemplating the scene as in composing any paragraph of the "Origin of Species." And if from the picture he enjoyed he was not led to think of its Artist, it was not his science which forbad. "In my most extreme fluctuations," he said, "I have never

been an atheist, in the sense of denying the existence of God."

It is true that the stress laid upon second causes, nowadays, tends to make some men ignore the First, and that the explanation of the smooth machinery of the world as due to the long friction of events has weakened the old-fashioned form of the "argument from design." Such theories as that of "Natural Selection" have not aided the ancient apologetics. But any loss that comes is our own fault, not that of modern science, which, as Professor Huxley distinctly states, has not created a single religious difficulty.

When we consider the lilies their teaching is nowise interfered with by all the botanical discoveries. For that teaching is the fact of beauty,—and there the beauty shines! I do not mean that this teaching belongs exclusively to flowers: beauty is, of course, found elsewhere. But nowhere else is it so displayed, so seemingly disconnected from use, so salient and self-reliant.

What if we can trace the ancestry of these brilliant blossoms back to some bare and homely duckweed, rootless, stemless, flowerless. Here are the lilies! And what if all their glory be the result of a long course of insect-culture, if the shape and flecking of petals and the grouping of golden anthers serve to entice or accommodate moths and bees. Here are the lilies, and here are we to rejoice in them! However beauty came it is. Undefinable, as all facts simple and radical must be, it is undeniable.

From out the stupendous mechanism of the universe appear exquisite pictures, now frescoed on the vault of the sky, now miniatured on the shard of a beetle. And these pictures are to be looked at. Unless there are spectators they do not really exist. In other words the argument for a Creative Mind drawn from evidences of design in nature has its clearest and most cogent proofs in natural beauty.

Much of the working of the world might be what it is, and go on as it does, were the world inhabited only by the brutes. In the far-off Devonian seas and Carboniferous

swamps the mollusks and the reptiles were governed by the same laws of matter as those which now constrain men.

Any inference from design, then, would have been of a Designer Who meant a world where the dust could quicken into protoplasm, and the protoplasm construct cells, and the cells group into reproductive structures. And that is what much of the argument comes to now. So that he who considers only matter, whether angular crystals or pliant flesh, can make some plausible reply to the reasoning of Paley. But, to use the words of Mozley, "When the materialist has exhausted himself in efforts to explain utility in nature, it would appear to be the peculiar office of beauty to rise up suddenly as a confounding and baffling extra which was not even formally provided for in his scheme."

That, granted sufficient space and time, matter might develop structures having qualities of permanence, and that the useful would tend to become the durable, that there should be a "survival of the fittest," this, while leaving the miracle of origin just where it was, might be regarded as eliminating the supernatural from the process. The useful would be its own explanation; because it serves the turn it lives on. But no such explanation can be given of beauty. The only turn it can serve is the delight of a clear eye and a gentle soul. "It is essential to the very sense and meaning of beauty that it should be seen; and inasmuch as it is visible to reason alone, we have thus in the very structure of nature a recognition of reason and a distinct address to reason, wholly unaccountable unless there is a higher reason or mind to make it. For what but reason can address reason?"

It is the human eye which is the real object of the gorgeousness in a sunset and the elegance in a frond of maidenhair fern. The brutes never see such things. Forms and hues are reflected on their retinas, brilliancy and oddity may excite their attention, but beauty they do not and cannot know. Even were we to allow that this wondrous human mind has been educed from mere animal capacities

my argument remains undisturbed. For the beautiful is the beautiful, and it is only beautiful to eyes which send their report to a soul.

No validity can be allowed to the assertion sometimes set up to break the force of this argument, the assertion that beauty is unreal and supposititious, a delusion due to our fondness for the familiar or our fancy for the strange. The facts are too many and too clear the other way.

That a savage tramples on blossoms, or a woman of society follows some ugly mode, or the writers on æsthetics differ as to certain points, cannot counterbalance the permanent and enthusiastic delight in beauty shown by all the noblest human beings, and their general agreement as to where beauty is displayed. One might as well argue the non-existence of sight or reason, because there are blind and idiotic, as to deny beauty because of some who never appreciate it.

The only valid explanation of the belief in beauty is that beauty really exists. But the acknowledgment of the beautiful is logically the confession of God. And it is the confession of a God who is much more than a Primum Mobile, a First Cause. The great picture gallery of the universe is the revelation of a Person, of a Mind willing to be known by other minds. The symmetry, the grace, the glory of nature are absurd, are impossible, are *not*, except as symbols placed by God upon His universe to express Himself to all contemplating spirits. The true reason of the lilies of the field is that we may consider them, may behold in their bright raiment the thought of God, may infer from them the perfection and the splendor which must by His intent belong to human life.

Consider the lilies, for it is they who preach this sermon most articulately. There is, indeed, much loveliness elsewhere, in clouds and snow, in gems and shells and plumage, in slopes of hillside and curving of waves, but nowhere else is beauty so common, so conspicuous and so independent, so plainly a divine message.

Grant, if you please, that the tools used to bring out these delicate contours and sweet colors, were, as the current theory claims, the innumerable hordes of insects, this does not obliterate the result, a loveliness no insect ever saw, but full of light and life for men. Moths and flies and bees and ants may be the immediate causes of all the different corollas. Each lily of the field may, as Professor Henslow insists, be "due to the responsive action of the protoplasm in consequence of the irritations set up by the weights, pressures, thrusts, tensions, etc., of the insect visitors." But the Sistine Madonna is not accounted for by an analysis of pigments or an enumeration of the bristles in a brush. That picture means a Raphael who conceived it, in whose mind it was before one tint stood on the canvas, and who in painting addressed himself to other and kindred minds, telling them his holy thought.

Such then is the lesson of the lilies; the vision of God given in all beauty gleams from each of their myriad mirrors. And this vision is more than a mere assurance that God exists. All beauty is sacramental, and the outward visible form conveys to the faithful an inward spiritual grace.

We are creatures of the dust, with a bony framework and a padding of flesh, with blood corpuscles and nerve-tissues, moving around in a gross, palpable world and knocking against lumps of matter at every turn.

We are also spiritual creatures, with thoughts, ideas, ambitions, aspirations, and it is as such creatures that we best estimate ourselves.

The world and our own bodies are often oppressive, bewildering, repulsive; all these laws of matter, chemic and electric forces, the varied impulses of the restless atoms, seem intolerable tyrannies over the soul, and we feel ourselves degraded by our carnal passions and susceptibilities. And so have arisen religions and philosophies having as their central doctrine a hatred and contempt for the material universe, — Dualisms, Buddhisms, Gnosticisms.

They are not so ridiculous as some people lightly deem; that evil comes from matter is a notion deriving specious support in a world where so much misery is material and so much sin is animal. Yet the dualistic systems are self-contradictory and irrational; and to say that matter is evil in itself is to deny that God created it. And here beauty comes in to give light and courage.

For what is all this loveliness, purifying and exalting us by its very presence, sending a holy calm to restless hearts and a happy light to shadowed minds,— what is it but the aspect of combinations of matter? Carbon, oxygen, potassium and the like, that is what the lilies are to a mere physiologist. The carrion in the ditch and the roses in the hedge are by chemical tests about the same. That portion of earth which is dull, depressing, disgusting, is made of the same elements as is all earth's blossoming splendor. This unspiritual matter can take shapes in which it becomes a blessed ministrant to our souls. And what does that mean but that beauty is God's sacramental glorifying of matter, His taking some of the common bread and wine and endowing them with a spiritual purpose and potency?

All is not beautiful, or we should not experience our educating probation; but enough is given to sustain and inspire.

Robert Browning, affectionately praising a quiet landscape in Normandy, declares:

> If we have souls, know how to see and use,
> One place performs like any other place
> The proper purpose every place on earth
> Was framed to furnish man with; serves alike
> To give him note that through the place he sees
> A place is signified he never saw
> But if he lack not soul may learn to know.

But this is because, as Browning immediately claims, there is "a beauty buried everywhere." The mystic teaching of nature, its voice to man's spirit, is in its beauty. For the brute the powers and utilities whereby he lives his animal

life; but for man those radiant gleams which tell of the other world and the life eternal.

See, God says, into what poetry this prose may be translated,— for a fog you shall have a rainbow and for dirt you shall have roses. And if God so clothe the transient mist and the fading grass, shall He not much more clothe men? If insensate matter is thus glorious what robes and crowns must be possible for humanity! Beauty is spiritual, is sacramental, is divine. Wherever we find it we find a pledge to assure us of God's love and a means whereby to receive God's grace.

The Transfiguration of Jesus is a supreme proof of the vital connection between the beautiful and the good; the Perfect Soul irradiates with splendor the Bodily Vesture. I conclude therefore that beauty is the highest revelation of God, which is made through nature; that by it the Infinite Wisdom declares Itself to the human mind and the Infinite Love to the human heart; and that this revelation is one which also declares the dignity of man, for it assumes his likeness to his Creator; they can enjoy the same noble delights. The revelation is written large and plain. All about us are its symbolic letters needing only faith and love for their decipherment. But its most common and most obvious utterances, most legible in their simplicity and most attractive in their sweetness, are "the lilies of the field." He must be dull indeed who, in considering them, does not behold "the wisdom and goodness of God."

PROCEEDINGS AT THE THIRD ANNUAL BANQUET,

GIVEN BY THE TRUSTEES OF THE GARDEN, MAY 19, 1892.

In response to invitations issued by the Board of Trustees under the provisions of the will of Mr. Shaw, the third banquet to the Trustees of the Garden and their guests was given at the Mercantile Club on the evening of the 19th of May, 1892. Covers were laid for about seventy-five guests. Among those present were:—

Professor C. R. Barnes,
University of Wisconsin.
Professor W. J. Beal,
Michigan Agricultural College.
Professor J. D. Butler,
Madison, Wis.
President J. M. Coulter,
University of Indiana.
Rev. C. G. Davis,
Jefferson City, Mo.
Professor A. F. Fleet,
Mexico, Mo.
Hon. Charles W. Garfield,
Michigan Board of Agriculture.
Dr. C. Hart Merriam,
U. S. Department of Agriculture.
Professor L. H. Pammel,
Iowa Agricultural College.
Professor G. D. Purinton,
Missouri State University.
Professor P. Schweitzer,
Missouri State University.
Professor L. R. Taft,
Michigan Agricultural College.
Mr. Arthur Winslow,
State Geologist of Missouri.

Judge E. B. Adams,
Mr. George K. Andrews,
Mr. George I. Barnett
Dr. Louis Bremer,
Mr. R. S. Brookings,
Mr. D. S. Brown,
Mr. Given Campbell,
Mr. George O. Carpenter, Jr.,
Mr. J. B. Case,
Mr. Daniel Catlin,
Mr. Thomas Dimmock,
Mr. Benjamin Eiseman,
Mr. H. W. Eliot,
Prof. J. W. Fairbanks,
Mr. G. A. Finkelnburg,
Mr. S. P. Galt,
Mr. O. L. Garrison.
Mr. M. L. Gray,
Mr. B. B. Graham,
Mr. C. S. Greeley,
Rev. Leon Harrison,
Mr. W. L. Huse,
Rev. J. P. T. Ingraham,
Mr. F. N. Judson,
Mr. J. E. Kaime,
Mr. Charles Knapp,
Mr. George E. Leighton,
Mr. J. R. Lionberger,
Judge George W. Lubke,

YUCCA BREVIFOLIA.

Mr. I. M. Mason,
Dr. H. H. Mudd,
Professor F. E. Nipher,
Mr. Charles Parsons,
Mr. C. C. Rainwater,
Mr. R. M. Scruggs,
Mr. A. F. Shapleigh,
Dr. D. S. H. Smith,
Rev. John Snyder,
Professor F. L. Soldan,
Judge Charles Speck,
Hon. E. O. Stanard,
Gen. John D. Stevenson,
Rev. H. A. Stimson,
Judge Samuel Treat,
Judge L. B. Valliant, and
Professor S. Waterhouse,
of St. Louis.

Mr. R. J. Lackland,
President of the Board,
Mr. A. D. Cunningham,
Secretary, and
Mr. Richard Bartholdt,
Chancellor W. S. Chaplin,
Mr. George S. Drake,
Dr. George J. Engelmann,
Mr. D. F. Kaime,
Judge George A. Madill,
Mr. C. F. Miller,
Mr. W. H. H. Pettus,
Professor H. S. Pritchett,
Rt. Rev. D. S. Tuttle, and
Mr. James E. Yeatman,
Trustees, and
William Trelease,
Director of the Garden.

After the dinner had been served, the Chairman, Chancellor W. S. Chaplin, introduced Professor J. D. Butler, of Madison, Wisconsin, a gentleman who had known the Founder of the Garden for many years, and who spoke as follows, in response to the toast of the evening — The Memory of Henry Shaw.

This banquet insures to Mr. Shaw perpetual memory. So long as men have stomachs he who fills them without money and without price will never be forgotten. A daily dole of bread and beer at Winchester has made Bishop Blois of precious memory there for eight hundred years. It has drawn me to that city more than once. It has drawn thither the Prince of Wales. All comers share the same gratuitous cheer, few forget the giver of their horn and crust. Mr. Shaw's school-days were near this hospitality. I believe that he tasted it, and so learned how to build himself a live-long monument.

My first visit to St. Louis was in 1865. I was soon told that if I went away without seeing Shaw's Garden I could never say that I had seen St. Louis. Such was my own opinion after my first morning there. On my second survey of the Garden I met Mr. Shaw. Our travels abroad had been in the same years and our tastes were congenial.

Before we parted he had urged me whenever I should come to the region to make my home with him. He explained his course of life so that I would have no doubt where to find him — whether in Locust street or in Tower Grove. The result was that I shared his hospitality not unfrequently during well-nigh a quarter of a century, and twenty years after our first acquaintance welcomed him under my own roof.

In our familiar talks he gave me many a leaf from his life-history. His school training was at Mill Hill, a Congregationalist academy near London. He loved to remember a cedar tree there which had been planted by Linnæus in 1736. Six years ago he pointed me to a tree near his grounds set out by himself and which had grown to be a hundred feet high. He was pleased when I quoted the couplet,

> "A forest planted by himself he sees,
> And loves its old contemporary trees."

He said each boy at Mill Hill had a square rod of ground assigned to him that he might till it just as he chose. If the child is father of the man — we here discern "the baby figure of the giant mass of things to come at large."

He told of voyaging with his father on an old Danish prize-vessel seventy-four days before they reached Quebec, of business outlooks there and at Montreal as not flattering,— of his New England sleigh rides to reach New York. As there seemed no room for him there he sailed to New Orleans, a voyage of twenty-three days.

Here Mr. Shaw was welcomed by an old family friend on his sugar plantation, and half resolved to become a sugar planter himself. But he knew more about cutlery than about cane-brakes. So, finding himself within ninety days of St. Louis by keel-boat, he resolved to go up the river. He was about going aboard a keel-boat when a schooner-rigged vessel arrived from Philadelphia which was also equipped as a steamer, and promised a passage to the

MILL HILL SCHOOL.

FROM A PLATE LOANED BY THE SECRETARY OF THE SCHOOL.

haven of his hope in forty-five days. He took the steamer, which arrived here on time. Less than two years before, the first steamer ever seen in St. Louis had been six weeks on the way from Louisville, in 1817. Before settling here Mr. Shaw made a keel-boat trip to St. Charles. That point being nearer the frontier he at first thought would be better for his enterprise.

His favorite seat in the town parlor was the same arm-chair with a table-leaf where he had sat in business years. There he spoke with me of his early endeavors.

He learned that tin was brought overland from Philadelphia costing nine dollars a hundred, while he could bring it from Liverpool for three. He was the first hardware importer by the water route, and he had his reward. As early as 1824 he obtained a contract for all the hardware needed in Chicago at Ft. Dearborn, and retained it for a dozen years. Sugar in those times ran up every year to twenty-five cents, but Mr. Shaw the first time he went down the river bid off a large lot, slightly damaged,— for two cents, and brought it up for one. It began to lie heavy on his hands when a United States flotilla arrived with supplies for posts above. They had no sugar, for the barge that bore it had sunk on a snag. Thus the only sugar within reach was in the store of Mr. Shaw. In fur his success was as good as in sugar. The growth of the city was then phenomenal, and he grew with it. Up to everything in aspiration, down to everything in drudgery of detail, he was naturally master of the situation. It is no marvel that within one and twenty years he had made all the money that a bachelor could need, and resolved henceforth to enjoy his fortune. Hence in part it came to pass that

> "Of no distemper, of no blast, he died,
> But fell like ripened fruit that mellowed long,
> E'en wondered at because he dropped no sooner."

Starting for foreign travel he stumbled on the threshold. April mud in 1840 was too much for the stage in which he

went from the Illinois river to Chicago. He came too late for the steamer and chafed a week in vexatious delay. It was forty-five years before he saw Chicago again.

His travels abroad were often topics of our talk and when my own at length outwent his, he was curious concerning my adventures. It gave him pleasure that I was reminded of his screw-pine in the Sandwich Islands and of his papyrus on the sea of Galilee. Were he here to-day how much he would ask about my recent pilgrimage beyond the Hesperides and in gardens among the antipodes.

Our departures gardenward from Locust street were notable. The iron-gate in front was first so secured that no hand could reach the bell. Then the carry-all was laden in the yard with garden needments, usually with a bag of silver,— and always with a huge horse-pistol tied into the holster with a string. "Always ready," he used to say, "and never wanted."

The Shakespeare mulberry on a spot selected by Madam Neilson has become celebrated. Mr. Shaw's first meeting with that incomparable Juliet was in the following way. We were talking together one Sunday afternoon in the back parlor, when a card was brought in from a lady who begged leave to dry her feet at the fire. It bore the name Adelaide Neilson, who was cordially greeted. The Garden she said had so charmed her that she had forgotten her thin shoes. She took them off and warmed her feet at the grate, she sitting one side, I the other and Mr. Shaw between. Our trio was the more genial as we had both been in Saragossa where she was born, and she was exultant at having finished her hundredth impersonation of Juliet.

When we last lingered in the Garden we halted at the Nuttall cenotaph in honor of the first botanist who ventured up the Arkansas. We passed on to the massive shrine of victory writing on a shield — to show the conquests of science. I proposed a Shakespearian inscription, "Ignorance the curse of God, knowledge the wing wherewith we fly to heaven." "Too many words," said he, "for the

shield, but I should like to see them on the cornice." His last choice however, was a motto still more divine, "O Lord, how manifold are thy works, in wisdom hast thou made them all."

We came then to his own mausoleum. I there first saw his statue recumbent on the lid of the sarcophagus,— but the sarcophagus itself was uncovered. As we stood there I told him that in the heart of the pyramid I had lain down in Pharaoh's coffin, and as I had had the last enjoyment of Pharaoh's tomb so, with his permission, I would be the first to make proof of his,— and I did. He wished I could lie there in his place forever.

In all my intercourse with Mr. Shaw he was full of the religious feeling which dictated, "Glory to God in the highest, on earth peace and good-will to men," to be written on the brow of his conservatory. Nevertheless I saw that he missed no sweet taste of the sweet world. He was keenly alive to sportive sallies whether in life or literature. In the Arboretum as he was one day denouncing the devastation of our forests an epigram which occurred to me he wished to hear often repeated. It was this:

> "Indulgent nature on each race bestows
> A secret instinct to discern its foes;
> The goose, — a silly bird — yet shuns the fox,
> Lambs fly from wolves, and sailors steer from rocks;
> A rogue the gallows as his fate foresees
> And bears a like antipathy to trees."

Wasteful woodmen were all gallows' birds in Mr. Shaw's eyes.

During my manifold sojourns with Mr. Shaw what struck me most was that he had never retired from business at all. He only changed the course of his activities. He transferred them from market and counting-room to garden and park. Hence wherever we walk in those acres we see them everywhere bearing his image and written with his superscription. He is there as ubiquitous as the spring-time which leaves no corner of the ground untouched.

When I first saw the Garden it was already inscribed over the gate, "The Missouri Garden." Even then Mr. Shaw always spoke of it as *the* Garden. But the people called it Shaw's Garden, and they always will. It was his in a higher sense than that of legal ownership. It was his creation, as he said in his will, "his thought and care and labor." No workmen were abroad there till his morning-bell called them up. Nothing was done by hand that his head had not planned. When Michael Angelo was asked why he did not carve his name on his statues he answered, "I mark them all over." Thus too, Shaw's characteristics are unmistakable upon all his gifts.

The crowning merit of Cæsar, as Mark Antony extolled it to the Romans, was:—

> He hath left you all his walks,
> His private arbors and new-planted orchards;
> On this side Tiber; he hath left them you
> And to your heirs forever; common pleasures,
> To walk abroad and recreate yourselves.
> Here was a Cæsar: when comes such another?

Another more worthy to be first in the hearts of his countrymen — thanks to personal garden-service,— his action enriching his gift, came to St. Louis in Henry Shaw. *Here* was a Cæsar; when comes such another?

In royal gardens I see sovereigns who have never lifted a finger to elaborate them praised for munificence. It is nothing but the old story of the fox exalted to be second in the kingdom because he had prescribed for the lion a plaster to be torn from the back of the bear. Shaw's offering on the other hand was not so much of his silver and gold as of himself — his whole self. That is the best gift which has in it the most of the giver.

Had Mr. Shaw given his fortune for a garden and park — with nothing more — nothing of time, toil, talent — we should always honor his memory. He would stand among those few millionaires who, as Burke said: Not content to reign in the dispensation of happiness during the limit of

human life, strive with all the reachings of vivacious mind to extend the dominion of their bounty beyond the bounds of nature, and to perpetuate themselves for generations of generations the guardians, the protectors, the nourishers of mankind.

But, as you all know, Shaw was not of the class who give mere endowments. His gift was not merely of what he had — but the best of it lay in what he *was*. This is the brightness of his glory. Therefore,

> The idea of his life doth sweetly creep
> Into your study of imagination;
> And every lovely organ of his life
> Doth come apparelled in more precious habit,
> More moving, delicate, and full of life,
> Into the eye and prospect of your souls
> Than when he lived indeed.

On the conclusion of Dr. Butler's address, Rev. Dr. H. A. Stimson, Dr. C. Hart Merriam and Rev. John Snyder were called upon by the Chairman, and made short speeches, after which the guests of the evening were dismissed in appropriate remarks by the Chairman.

PROCEEDINGS AT THE THIRD ANNUAL BANQUET TO GARDENERS, FLORISTS AND NURSERYMEN,

GIVEN AT THE MERCANTILE CLUB, NOVEMBER 7, 1892.

On behalf of the Board of Trustees, invitations were issued in the autumn for the third gardeners' banquet, provided for in Mr. Shaw's will, in response to which about seventy-five gentlemen assembled at the Mercantile Club on the evening of the 7th of November, 1892, among them being:—

MR. LEVI CHUBBUCK,
Secretary State Bd. Agriculture.
MR. A. S. HALSTEAD,
Belleville, Ill.
PROFESSOR C. A. KEFFER,
of the State University.
MR. G. E. MEISSNER,
Bushberg, Mo.
MR. E. A. RIEHL,
Pres. So. Ill. Horticultural Soc'y.
JUDGE A. J. SHORES,
Clayton, Mo.
MR. G. K. ANDREWS,
MR. LUTHER ARMSTRONG,
MR. E. BEAUMONT,
MR. J. J. BENEKE,
MR. CHAS. BEYER,
MR. D. S. BROWN,
MR. C. BUECHLER,
MR. D. I. BUSHNELL,
MR. H. W. CHANDLER, JR.,
HON. N. J. COLMAN,
MR. CHALMER D. COLMAN,
MR. CHAS. CONNON,
MR. J. F. DICKMANN,
MR. WM. ELLISON,
MR. JOS. EPSTEIN,
MR. RICHARD FROW,
MR. J. P. FECHTER,
City Park Commissioner.
MR. E. W. GUY,
MR. J. K. GWYNN,
Comr. Columbian Exposition.
MR. HENRY C. HAARSTICK,
MR. W. A. HANFT,
MR. L. HUNT,
Supt. Lafayette Park.
MR. P. JACKSON,
MR. J. M. JORDAN,
MR. S. KEHRMANN, JR.,
MR. J. KOENIG,
MR. C. A. KUEHN,
MR. J. W. KUNZ,
MR. LEONARD MATTHEWS,
MR. E. A. MICHEL,
MR. E. H. MICHEL,
MR. C. W. MURTFELDT,
MR. A. OPPERMANN,
MR. F. W. OSTERTAG,
MR. H. C. OSTERTAG,
MR. ROBERT OUGHTON,
MR. WM. PAPE,
MR. F. S. PLANT,
MR. C. E. PRUNTY,
MR. C. C. SANDERS,
MR. EMILE SCHRAY,

YUCCA BREVIFOLIA.

Mr. Wm. Schray,
Mr. Jacob Stocke,
Mr. Jacob Stocke, Jr.,
Mr. Robert F. Tesson,
Mr. Henry Ude,
Mr. A. Waldbart,
Mr. F. C. Weber,
Mr. W. J. Wellhouse,
Mr. J. Wuebbold, and
Mr. Eugene Wurst,
of St. Louis.

Mr. Jos. W. Branch,
Mr. George S. Drake,
Mr. Henry Hitchcock, and
Professor H. S. Pritchett,
Trustees of the Garden.

Mr. A. D. Cunningham,
Secretary of the Board.

Wm. Trelease,
Director of the Garden.

Mr. J. C. Bay,
Mr. F. W. Dewart, and
Mr. J. C. Duffey,
Assistants at the Garden.

Mr. J. G. Smith,
Assistant at the
School of Botany.

Mr. Jas. Gurney,
Head Gardener, and

Mr. Thomas Doss,
Mr. J. W. Dunford,
Mr. Philip Giebel,
Mr. Jos. Lesyna,
Mr. C. I. Paige,
Mr. J. M. Paige,
Mr. Chas. Schmidt, and
Mr. M. Zavadil,
of the Botanical Garden.

On the conclusion of the menu, the Chairman, Mr. Trelease, welcomed the assembled guests, and proposed the following toasts:—

Henry Shaw, responded to by Henry C. Haarstick, of the Board of Commissioners of Tower Grove Park.

The Columbian Exposition, response by J. K. Gwynn, Executive Commissioner for Missouri.

The Market Gardener, response by Henry Ude, President of the Market Gardeners' and Fruit Growers' Association of St. Louis.

Horticulture, response by J. C. Duffey, Horticultural Assistant at the Garden.

Our Park System, response by John P. Fechter, Park Commissioner of St. Louis.

The Florist, response by Charles Connon, of the St. Louis Florists' Club.

The Scientist, response by Professor H. S. Pritchett, President of the Academy of Science of St. Louis.

YUCCA ELATA.

SCIENTIFIC PAPERS.

LIST OF PLANTS COLLECTED IN THE BAHAMAS, JAMAICA AND GRAND CAYMAN.

BY ALBERT S. HITCHCOCK.

Preface.

The collections upon which the list is based, were made during the winter of 1890–91, for the Missouri Botanical Garden, while the writer was one of a party of naturalists headed by Dr. J. T. Rothrock. Of the Bahamas, the following islands were visited; New Providence, Eleuthera, Cat, Watling's, Crooked, Fortune, Inagua. Several days were spent on each island except Watling's, where, owing to the surf, but one landing was made. In Jamaica four ports were visited, Kingston, Port Morant, Port Antonio and Lucea. From Kingston an excursion was made to Bog Walk, the specimens labeled thus being collected between there and Spanish Town. Another excursion was made to Blue Mountain Peak. Specimens labeled Blue Mts. were collected between Gordontown and Abbey Green; those labeled Blue Mt. Peak were collected between Abbey Green and the Peak. Constant Springs, a suburb of Kingston, was also visited. On the return voyage a stop of three days was made at the island of Grand Cayman.

The total number of the species determined is 953, to which are to be added the varieties and the cultivated plants.

A large number of doubtful specimens were compared at Cambridge, and I wish to thank the persons connected with the herbarium for their kindness in placing the facilities at my disposal. The herbaria at Columbia College and at the Department of Agriculture were also briefly consulted.

About three-fourths of the ferns were determined by Mrs. Maud Wislizenus.

Following the catalogue is a tabulated list of the plants collected in the Bahamas, from which it will be seen that the Bahaman flora has come from the South and not from the United States.

Dr. Rothrock kindly placed his collection at my disposal, and a few species and localities, indicated by the letter (R), were thereby added. It has also been possible to include in the list a small collection made at Porus, Jamaica, by Mr. C. G. Lloyd, in January, 1892.

Since the introduction of the binomial system of nomenclature by Linnæus, the name of a plant has consisted of two parts, the first, or generic, to show its position in the classification of the vegetable kingdom, the second, or specific, to distinguish it from others of the same genus. One of the advantages of a system of nomenclature is the certainty with which a given plant can be indicated, and hence it becomes more useful as it is more uniform, and it is only by the concerted action of botanists that uniformity can be obtained. Two ways by which this can be accomplished are by following an authority, or set of authorities, or by establishing a system of botanical nomenclature. Probably the greatest difficulty with the first method is that one man can know sufficiently well to be called an authority, only a limited flora or a limited portion of the vegetable kingdom, and when his work is to be incorporated with that of others many difficulties arise. Or his successors may wish to establish names of their own. We see how the names of Walter and Michaux were discarded by Persoon, and how few of Rafinesque's names were adopted by his successors.

But it is now quite generally conceded that we must look to the second method for stability. The first step in this direction was the adoption of the law of priority. But from this point opinions diverge; some saying that we should commence to apply the law, at the date of Linnæus'

Species Plantarum, 1753, while others would allow no limit. The argument in favor of the former is that the second part of a pre-Linnæan binomial was not a specific name but a phrase accidentally consisting of but one word.

Again, opinions differ as to whether a name dates from the time the plant is placed in a given genus or from the original description. In the one case it is held that the name is the combination of the genus and species and must date from the time this combination is made. Thus when a species is transferred from one genus to another, the plant receives a new name, which may or may not have a connection with the previous name. The Botanical Congress modified this by saying that if a plant is transferred, the new specific name should be the same as the old. However, if an author does not do this, but gives a different specific name, his binomial would stand unless discarded on other grounds. The laws of this school require, therefore, that a given plant should bear the binomial first given to it under the accepted genus. This has seldom, possibly never during this century, been strictly adhered to by any botanist in an extended work. The oldest name may have been little used, or it may have seemed inappropriate; or a plant may have been long known in one genus, but on being transferred to another has been given a different specific name, and a subsequent author has restored the original. This has been the fate of many of Rafinesque's names in the hands of Dr. Gray and Mr. Bentham.

In the second case the original specific name is considered to be the essential feature in nomenclature. This should be retained through whatever changes in classification the plant may go. As in the previous case, this rule has never been strictly adhered to in any extended work. Many botanists have done so more or less closely and much discussion has taken place lately, particularly in this country, regarding the principles of this second or "re-

formed" method of nomenclature. I will enlarge somewhat on these principles as I understand them. Assuming undoubted identity and sufficient publication, priority would be decided by the date of the latter, or, in a given work, by lineal sequence, even on the same page. In transferring from one genus to another the plant retains its old specific name under the new genus. But if there be already a plant in this genus bearing the same name, the two cannot be distinguished. Logic would probably require the one having the oldest specific name to stand, but I believe this is not followed by any of the new school. Instead, the one already in the genus is given the advantage, the other taking a new name. Not only should the original specific name be used in all cases but if at any time this has not been done, the original name should be restored. This is the important difference between this system and the first. In the one case, if a new specific name is given, it must be used; in the other case a new specific name is discarded and the old one restored. It logically follows that the identity of the generic and specific names is no reason for discarding the latter. This gives rise to such binomials as *Catalpa Catalpa* and *Ananas Ananas*. It will also give us such names as *Coix Lachryma Jobi*, L. and *Chrysocoma Coma aurea*, L., and possibly *Melilotus Melilotus officinalis*.

For the same reason, if two species with the same specific name occur in a genus, and subsequently the plant whose name was necessarily changed, is transferred to another genus, the original name should be restored. For example: *Celtis Lima*, Sw. (Fl. Ind. Occ. i) and *C. Lima*, Lam. (Dict. iv) are different species. The latter was consequently changed to *C. Lamarckiana*, R. & S. (Syst. vi). But when taken out of the genus *Celtis* the original name *Lima* should be restored.

If two species are united or one is made the variety of another, the older name persists. This is quite inconvenient when the older is a local or abnormal form. If a

species is divided, the original name persists for one of the parts, the older if that can be determined.

If an original description clearly refers to a different plant from one which the author has named in an herbarium, the name would apply to the plant described.

In regard to priority of genera there is as much difference of opinion as in the case of species, some allowing no limit but taking up names of the old herbalists, while others think that for convenience an arbitrary starting point should be chosen, such as Tournefort's Institutiones Rei Herbariæ in 1700, or the first edition of Linnæus' Genera in 1737 or the sixth edition in 1764.

One of the questions which causes serious practical difficulties is what constitutes sufficient publication. With species it is generally held that what will identify the plant will establish the name, as a description, a reference to a published plate, or a synonym; and this is published when issued in printed form and publicly distributed. Hence herbarium or manuscript names are not thus published. In the case of printed descriptions privately distributed or sets of exsiccatæ placed on sale, it is an open question whether this constitutes publication. If an edition of one thousand copies of a work containing original descriptions of plants, should be accidentally destroyed, except one copy, the new names would probably be considered as published.

With genera it is more difficult to draw the line between sufficient and insufficient description. Is it necessary to give at least the important characters which are common to the species of a genus? Or is it only necessary to indicate what species form a genus? A few examples will illustrate some of the doubtful points. In Linnæus' Species Plantarum, a generic name without description heads a list of described species. In Patrick Browne's History of Jamaica we find, for example, "Sciodaphyllum 1. Foliis majoribus oblongis petiolis communibus umbellatim affixis, floribus spicatis. Tab. 19, fig. 1, 2." Following this is a descrip-

tion in Latin of the parts of the flower and then a description of the tree in English. This genus is accepted by Bentham and Hooker (Gen. Pl. i, p. 940), and is cited "Sciadophyllum P. Br. Jam., p. 190, t. 19."

In the Journal de Botanique, ii, 1809, p. 166, is an article entitled "Prospectus de M. Rafinesque Schmaltz, relatif à deux ouvrages sur la Botanique du Nord de l' Amérique; traduit du Medical Repository de New Yorck, vol. 5, p. 350 [1808], par M. N. A. Desvaux."

Rafinesque here proposes several new genera, to be formed by separating species from old genera. At the head of the list is "1. Adlumia *cirrhosa;* qui est la Fumaria *fungosa* d'Aiton, ou S. *erecta* [F. recta] de Michaux." De Candolle (Syst. ii, p. 111, 1821) takes up the name "Adlumia, Raf. in Desv. journ. bot., 1809, 2, p. 169," giving a description; and succeeding authors quite generally use Adlumia, Raf. On page 171 of the above mentioned article appears "21. Achroanthes *unifolia;* Malaxis *unifolia* Mich."

In 1818 Nuttall (Gen. ii, p. 196), proposes the genus Microstylis, giving the characters on which the separation from Malaxis would be made, but the actual separation was made by Eaton (Man. Ed. 3, 1822).

Did Rafinesque establish the genus *Achroanthes*, and therefore does it have priority over *Microstylis?* If not should not the first example be quoted *Adlumia*, Raf. in DC. Syst.? Prof. Greene (Pittonia, Sept. 1891) considers the evidence sufficient for the restoration of *Achroanthes*, and renames the North American species. In this connection it is a curious fact that most authors from Lindley (Orch. 1833) to Hemsley (Biol. Cent. Am. iii, 1883) and Greene (l. c.) quote *Malaxis umbellulata*, Sw. Prod., though Swartz's specific name is *umbelliflora*.

Some of Linnæus' genera were published for the first time in the Species Plantarum, and it is perfectly clear what his genus is in most cases. Browne's genera appearing in a local flora are less clearly defined. At all events genera

so established will doubtless be accepted if they have subsequently been taken up and sufficiently characterized before another name was given them. The critical point is whether one is justified in restoring a genus established as in the above examples, and discarding a later well known name. *Ichthyomethia*, P. Br. is accepted by Sargent (Gard. & For. Oct. 7, 1891) and Britten (Jour. Bot. xxix, No. 347, p. 352).

It would seem that the original generic or sectional name should be as permanent as the original specific or varietal name. In 1825 (Prod. ii; Mem. Leg. vi) De Candolle described under the genus *Clitoria* the section *Centrosema*. In 1826 Desvaux (Ann. Sci. Nat. ix) described a genus which corresponded to this section, giving the name *Cruminium*. Subsequently the section *Centrosema* was raised to a genus (Benth. Ann. Mus. Wien. ii, 1838). The logical application of the law of priority as marked out in the case of species would require that *Centrosema* should be used instead of *Cruminium* as is done by Dr. Britton (Bull. Torr. Club, Oct. 1891).

It is probably the general opinion that though the name of a genus of plants may be the same as that of a genus of animals, a generic name among phanerogams should not be identical with one among cryptogams. In this case *Setaria*, Ach. may have priority over *Setaria*, P. Beauv. (conf. note in catalogue). It is also thought by some that a name identical with an earlier one which has passed into synonymy should be discarded. This seems unnecessary so long as the earlier name is a synonym, yet the rule is a good one and may be adopted.

As to the method of quoting authorities of binomials, there seems to be no settled opinion among the new school botanists. Some would quote only the author of the original specific name, some only the author of the accepted combination, while others would quote both, in which latter case the author of the specific name is placed in parenthesis. Thus when *Malva rosea*, DC. Prod. i, is transferred to *Mal-*

vastrum by Hemsley (Biol. Cent. Am. i, p. 99), we have *M. roseum*, (DC.), *M. roseum*, Hemsl., or *M. roseum*, (DC.) Hemsl. It appears in the above work, *Malvastrum* (*Malva*) *roseum*, (DC.).

The matter of quoting is of secondary importance. In a critical work the synonymy with date and place of publication is given and one can see at a glance the history of a species. In lists or casual references to plants it is not necessary to cite the author except to distinguish between two species having the same name, in which case the author of the combination is certainly more distinctive. But if the question of credit to the author is considered important, both should be cited. Yet in case the name is preoccupied the former author does not receive his due credit, while if an older name in another genus is restored, the author of such a combination gets more credit than is his due.

In the appended catalogue I have used the double citation system, as it is in use among mycologists and also brings out more points of the new system. The "new" or "reformed" system has been frequently referred to; in practice it is not new but has only recently been brought forward among phenogamic botanists as a *system* of nomenclature.

If an author describes a species in one genus and afterwards transfers it to another, double citation would require that his name appear both in the parenthesis and outside, as it is an accident that the two are the same; also if a section or other division of a genus is raised to generic rank, the author of the former should be written in parenthesis, as *Centrosema*, (DC.) Benth.

The older authors are not always to be depended upon in their references. For example, "Linn. Spec. Pl." frequently refers to the second edition. The second edition of the Species is often cited for names which first appeared in the tenth edition of the Systema Vegetabilium, 1759. Swartz's Fl. Ind. Occ. is sometimes cited for names which appeared several years earlier in his Prodromus, 1788.

Authors are not infrequently cited for varietal names for which they are not responsible; for example, in DC. Prod. iv, p. 541, we find "*Spermacoce verticillata*, var. *Americana*, L. Spec." and "var. *Africana*, L. Spec." Linnæus merely says under *S. verticillata*, "Habitat Jamaica, Africa." (I will remark here that it is much easier to find errors in another's work than it is to exclude them from one's own.)

Another doubtful point is illustrated by *Echinopepon cirrhopedunculatus*, Rose, Contr. Nat. Herb. Vol. i, No. 4. In a foot-note the remark is made that some authors would name the plant *Echinocystis cirrhopedunculata*, others *Micrampeles cirrhopedunculata*. In case these latter combinations are used should Rose be cited as their author? Probably not, as the author of a combination thus records his opinion as to the name the plant should bear.

It would be convenient if, as some have suggested, the names of well marked varieties were always different from all species of the genus. In a critical work their proper relation to the species would be shown, but in ordinary references they could be counted as species. This saves time and is just as definite.

In citing authors for species which have been separated from others, it would certainly be more indicative to connect with both the name of the author who made the separation. A reference to *Epilobium coloratum*, Muhl. may mean *E. adenocaulon*, Hauskn., but a reference to *E. coloratum*, Hauskn. would leave no doubt. This, however, is not in accordance with the new system.

In case the spelling of a generic or specific name has been changed, should the author of the correction be cited? He certainly is not the author of the genus or species, only the author of the correction, yet it would hardly do to cite an author for a spelling which he did not use. In this catalogue I have used the original spelling so far as that could be ascertained, except in cases of clearly typographical errors.

In the following catalogue, the starting point for genera and species has been taken at the first edition of Linnæus' Species Plantarum, 1753.* In very many cases the earliest name can be decided upon only by a monographer who examines the original specimens.

Cultivated species are included only when specimens were obtained, and are placed in lower case type. All the species in small capitals were found indigenous or naturalized.

In the names, sequence and limitation of orders, Bentham and Hooker's Genera Plantarum has been followed, except that *Coniferae* have been placed after *Gramineae*. This work has also been followed for the sequence, and, in most cases, the limitation of genera. The species are arranged alphabetically under the genera. The ferns are arranged according to Hooker and Baker's Synopsis Filicum.

* It was intended to take as the initial point for genera, Linnæus' Genera Plantarum, Ed. I, 1737; and to admit specific names identical with the generic. But owing to delays the paper did not go to press till after certain principles of nomenclature were adopted by the Botanical Club of the A. A. A. S. It was thus possible to make the nomenclature conform to these rules. Unfortunately the corrections were necessarily made in the absence of much of the literature.

Catalogue of Plants.

RANUNCULACEÆ.

Clematis, L. Gen. 1737; Rupp. Fl. Jen. 1718.

C. DIOICA, L. Syst. x. 1759.
Bog Walk.

C. FLAMMULASTRUM, Griseb. Pl. Wr. i. 1860.
Eleuthera.

Ranunculus, L. Gen. 1737; Tourn. Inst. 1700.

R. CUBENSIS, Griseb. Cat. Pl. Cub. 1866.
Blue Mt. Peak.

The petals are only about 2 mm. long; the fruit is that of Wr. Pl. Cub. 1838 (*R. Cubensis*) but the radical leaves are 3-divided with the terminal leaflet stalked. This may be *R. repens*, var. *tropicus* of Griseb. Fl. B. W. I. but does not seem to be *R. præmorsus*, HBK. (Mandon, Pl. And. Bol. 876, 877, Spruce, And. Ecuad. 5586) nor *R. Bonplandianus*, HBK. (Spruce, And. Ecuad. 5125), both of which are quoted as synonyms of var. *tropicus* by Grisebach.

ANONACEÆ.

Anona, L. Gen. 1737.

A. MURICATA, L. Spec. 1753.
Port Morant; Lucea.

A. PALUSTRIS, L. Spec. Ed. 2, 1762.
Kingston.

A. RETICULATA, L. Spec. 1753.
Lucea.

A. Cherimolia, Mill. Dict. 1768, Cult. Blue Mts.

MENISPERMACEÆ.

Cissampelos, L. Gen. 1737.

C. PAREIRA, L. Spec. 1753.
Constant Springs; Porus; Port Morant; Lucea.

NYMPHÆACEÆ.

Castalia, Salisb. Ann. Bot. ii. 1805.

C. AMPLA, Salisb. l. c. *Nymphæa,* DC. Syst. ii. 1821.
Grand Cayman.

PAPAVERACEÆ.

Argemone, L. Gen. 1737; Tourn. Inst. 1700.

A. MEXICANA, L. Spec. 1753.
Nassau; Eleuthera; Fortune Is.; Inagua; Grand Cayman.

Bocconia, L. Gen. 1737; Plum. Gen. 1703.

B. FRUTESCENS, L. Spec. 1753.
Blue Mt. Peak.

CRUCIFERÆ.

Brassica, L. Gen. 1737; Tourn. Inst. 1700.

B. JUNCEA, (L.). *Sinapis juncea,* L. Spec. 1753. *S. brassicata,* L. Syst. Nat. Ed. 14, 1767; *S. integrifolia,* Willd. Hort. Berol. 1816.
Lucea.

Lepidium, L. Gen. 1737; Tourn. Inst. 1700.

L. VIRGINICUM, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Inagua; Porus; Blue Mts. (R).

CAPPARIDACEÆ.

Cleome, L. Gen. 1737.

C. PUNGENS, Willd. Hort. Berol. 1816. *C. pungens,* var. *Swartziana,* Griseb. Fl. B. W. I. 1864.
Kingston; Port Antonio; Lucea.

The Jamaica specimens all have glandular ovary and pod, which corresponds to Willdenow's description of "Siliqua . . . . piloso-viscosa." Hence the smooth form (C. heptaphylla, Sw. presumably, though Swartz does not say the pods are smooth), should be made a variety of *C. pungens* and would therefore be *C. pungens,* var. *heptaphylla,* (Sw.) = *C. heptaphylla,* Sw. Obs. 1791 (not L. Spec. Ed. 2, 1763).

C. POLYGAMA, L. Spec. Ed. 2, 1763.
Port Antonio.

Polanisia, Rafin. Jour. Phys. lxxxix. 1819.

Jacksonia, Rafin. Med. Repos. 1808, was established in the same manner as *Achroanthes* (see Introduction).

P. ICOSANDRA, (L.) Wight & Arn. Prod. Pl. Ind. 1834. *Cleome,* L. Spec. 1753. *C. viscosa,* L. l. c., following *C. icosandra.*

Kingston; Constant Springs.

For note on nomenclature, see W. & A. l. c. p. 22.

Gynandropsis, DC. Prod. i. 1824.

G. PENTAPHYLLA, (L.) DC. Prod. i. 1824. *Cleome,* L. Spec. Ed. 2, 1763.

Nassau; Eleuthera.

VIOLARIEÆ.

Sauvagesia, L. Spec. 1753.

S. ERECTA, L. Spec. 1753.

Port Antonio.

CANELLACEÆ.

Canella, P. Br. Hist. Jam. 1756. *Winterania,* L. Hort. Cliff. 1737.

C. WINTERANA, (L.) Gærtn. Fr. i. 1788. *Laurus Winterana,* L. Spec. 1753. *Winterana Canella,* L. Syst. x. 1759. *Winterania Canella,* L. Spec. Ed. 2, 1762. *Canella alba,* Murr. Syst. Ed. 14, 1784 ("Dal. Pharm. 1693").

Grand Cayman.

BIXINEÆ.

Bixa Orellana, L. Spec. 1753, Cult. Bog Walk; Porus; Port Antonio.

Thamnia, P. Br. Hist. Jam. 1756. *Lætia,* "Lœfl. It." 1758; L. Syst. x. 1759.

T. SWARTZII. *Lætia Thamnia,* Sw. Prod. 1788.

Lucea.

Myroxylon, Forst. Char. Gen. 1776, not L. f. Suppl. 1781. *Xylosma,* Forst. Prod. 1786.

Myroxylon is adopted by Poiret in Dict. Nat. Sc. vol. xxxi. p. 465.

M. BUXIFOLIUM, (Gray) Kr. & Urb. in Engler, Jahrb. XV. 1892. *Xylosma buxifolium*, Gray in Griseb. Pl. Wr. i. 1860.

Var. PAUCIFLORUM, (Wr.). *X. buxifolium*, var. *pauciflorum*, Wr. in Griseb. l. c.

Nassau.

POLYGALEÆ.

Polygala, L. Hort. Cliff. 1737; Tourn. Inst. 1700.

P. PANICULATA, L. Syst. x. 1759.

Bog Walk; Port Antonio.

CARYOPHYLLEÆ.

Silene, L. Gen. 1737.

S. ARMERIA, L. Spec. 1753.

Blue Mt. Peak.

Cerastium, L. Gen. 1737.

C. VISCOSUM, L. Spec. 1753.

Blue Mt. Peak.

Alsine, L. Gen. 1737. *Stellularia*, L. Syst. Nat. Ed. 6, 1748.

A. MEDIA, L. Spec. 1753. *Stellaria*, Vill. Delph. in Gilb. Syst. Pl. i. 1785.

Blue Mt. Peak.

Dr. Britton called my attention to the fact that *Alsine* had been neglected.

Arenaria, L. Gen. 1737.

A. LANUGINOSA, (Michx.) Rohrb. in Mart. Fl. Bras. *Spergulastrum*, Michx. Fl. 1803. *A. diffusa*, Ell. Sk. i. 1821.

Blue Mt. Peak.

Drymaria, Willd. in Roem. & Sch. Syst. v. 1819.

D. CORDATA, Willd. l. c.

Blue Mt. Peak; Porus; Port Antonio.

PORTULACACEÆ.

Portulaca, L. Gen. 1737; Tourn. Inst. 1700.

P. OLERACEA, L. Spec. 1753.

Eleuthera; Lucea; Grand Cayman.

Var. PARVIFLORA, (Haw.) Griseb. Fl. B. W. I. 1864. *Portulaca parviflora*, Haw. Synops. 1812.
Nassau; Eleuthera; Inagua.

P. PILOSA, L. Spec. 1753.
Eleuthera; Watling's; Fortune Is.; Inagua; Kingston.

Talinum, Adans. Fam. 1763.

T. PANICULATUM, (Jacq.) Gærtn. Fr. ii. 1791. *Portulaca*, Jacq. Pl. Carib. 1760. *T. patens*, Willd. Spec. 1799. *Portulaca patens*, L. Mant. ii. 1772.
Blue Mts.

T. TRIANGULARE, (Jacq.) Willd. Spec. ii. 1799. *Portulaca*, Jacq. Pl. Carib. 1760. *P. racemosa*, L. Spec. Ed. 2, 1762.
Kingston.

HYPERICACEÆ.

Ascyrum, L. Gen. 1737; Tourn. Inst. 1700.

A. HYPERICOIDES, L. Spec. 1753.
Blue Mt. Peak.

GUTTIFERÆ.

Clusia, L. Gen. 1737.

C. FLAVA, Jacq. Pl. Carib. 1760.
Grand Cayman.

MALVACEÆ.

Malvastrum, (DC.) Gray, Pl. Fendl. 1849. *Malva*, Sect., DC. Prod. i. 1824.

M. AMERICANUM, (L.) Torr. Mex. Bound. 1859. *Malva*, L. Spec. 1753. *Malvastrum tricuspidatum*, Gray, Pl. Wr. i. 1852.
Nassau; Kingston; Porus.
Carpels not tricuspidate, Inagua; Grand Cayman.

M. SPICATUM, (L.) Griseb. Veg. Carib. 1857. *Malva*, L. Syst. x. 1759.
Kingston; Constant Springs; Blue Mts.; Lucea.

Sida, L. Gen. 1737.

S. ACUMINATA, DC. Prod. i. 1824.
Eleuthera; Cat Is.; Fortune Is.

S. CARPINIFOLIA, L. f. Suppl. 1781.
Nassau; Eleuthera (R.); Inagua; Constant Springs; Bog Walk; Porus; Port Morant; Grand Cayman.

S. CILIARIS, L. Syst. x. 1759.
Fortune Is.; Inagua.

S. CORDIFOLIA, L. Spec. 1753.
Var. ALTHÆIFOLIA, (Sw.) Griseb. Fl. B. W. I. 1864. *Sida*, Sw. Prod. 1788.
Kingston.

Calyx hispid; carpels 5 or 6 and shortly bidentate.

S. GLOMERATA, Cav. Diss. i. 1785.
Fortune Is.

S. NERVOSA, DC. Prod. i. 1824.
Kingston.

S. PYRAMIDATA, Cav. Diss. i. 1785.
Porus.

S. RHOMBIFOLIA, L. Spec. 1753, var. RETUSA, (L.) Griseb. Fl. B. W. I. 1864. *Sida*, L. Spec. Ed. 2, 1763.
Port Morant; Porus.

S. SPINOSA, L. Spec. 1753.
Kingston; Porus; Port Morant.
Var. ANGUSTIFOLIA, (Lam.) Griseb. Fl. B. W. I. 1864. *Sida*, Lam. Dict. 1783.
Eleuthera; Inagua; Kingston.

S. ULMIFOLIA, Cav. Diss. 1785.
Constant Springs; Bog Walk; Lucea.

S. URENS, L. Syst. x. 1759.
Eleuthera; Bog Walk; Blue Mts.; Port Antonio; Lucea; Porus.

Bastardia, HBK. Nov. Gen. v. 1821.

B. VISCOSA, (L.) HBK. l. c. *Sida*, L. Syst. x. 1759.
Nassau; Kingston.

Wissadula, "Medic. Malv. 1787."

W. DIVERGENS, (Benth.). *Sida divergens*, Benth.
Kingston; Grand Cayman.

W. PERIPLOCIFOLIA, (L.) Griseb. Cat. Pl. Cuba, 1866. *Sida*, L. Spec. 1753.
Kingston; Porus; Constant Springs.

Abutilon, Adans. Fam. 1763; Tourn. Inst. 1700.

A. CRISPUM, (L.) Don, Gen. Syst. i. 1831. *Sida*, L. Spec. 1753.
Eleuthera; Grand Cayman.

A. PERMOLLE, (Willd.) Don, l. c. *Sida*, Willd. Enum. 1809.
Nassau; Eleuthera; Inagua; Grand Cayman.

Malachra, L. Mant. i. 1767.

M. CAPITATA, (L.) L. Syst. Nat. Ed. 12, 1767. *Sida*, L. Spec. 1753.
Lucea; Grand Cayman.

Var. ALCEIFOLIA, (Jacq.) Griseb. Fl. B. W. I. 1864. *Malachra*, Jacq. Ic. Rar. iii. 1786-93.
Lucea.

M. URENS, Poit. in Schrad. N. Jour. ii. 1807.
Port Morant.

Urena, L. Gen. 1737; Dill. Hort. Elth. 1732.

U. LOBATA, L., var. AMERICANA, (L. f.) Griseb. Fl. B. W. I. 1864. *Urena*, L. f. Suppl. 1781.
Blue Mt. Peak; Lucea; Porus.

U. SINUATA, L. Spec. 1753.
Bog Walk; Grand Cayman.

Pavonia, Cav. Diss. ii. 1786.

P. BAHAMENSIS, n. sp. (Plate, 1.)
Fortune Is.

A shrub with reddish, glabrous branches; leaves ovate, cordate, apex obtuse, 5 to 7 nerved, margin entire or slightly sinuate, both surfaces and petiole very sparsely and minutely stellate pubescent, 3 to 4 cm. long, 2¼ to 3 cm. broad; petiole 1¼ to 2 cm. long; flowers axillary, peduncles

exceeding the leaves, 3 to 5 cm. long; bractlets about 7, linear, obtuse, about the length of the calyx, united at base; carpels 5, glabrous, separating from the axis, dehiscent at apex, 2-winged above, dorsal suture prominent, wings rounded at apex, no teeth or awns.

Near *P. spicata*, Cav., but differs in being nearly glabrous, the smaller and obtuse leaves, axillary inflorescence and having the carpels rounded at the apex.

P. SPICATA, Cav. Diss. iii. 1787. *P. racemosa*, Sw. Fl. Ind. Occ. ii. 1800. *Althæa racemosa*, Sw. Prod. 1788.
Port Antonio.

P. SPINIFEX, (L.) Cav. Diss. iii. 1787. *Hibiscus*, L. Syst. x. 1759. Porus.

P. TYPHALEA, (L.) Cav. Diss. ii. 1786. *Urena*, L. Mant. ii. 1771.
Blue Mts.; Bog Walk; Porus; Port Morant; Port Antonio.

Malvaviscus, Adans. Fam. 1763; Dill. Hort. Elth. 1732.

M. ARBOREUS, Cav. Diss. iii. 1787. *Hibiscus Malvaviscus*, L. Spec. 1753.
Port Antonio; Grand Cayman.

Var. PILOSUS, (Macf.). *Malvaviscus pilosus*, Macf. Fl. Jam. 1837.
Blue Mt. Peak.

Hibiscus, L. Gen. 1737.

H. ESCULENTUS, L. Spec. 1753.
Cat Is.; Lucea.

H. TILIACEUS, L. Spec. 1753.
Port Antonio.

H. VITIFOLIUS, L. Spec. 1753.
Kingston.

H. Rosa-Sinensis, L. Spec. 1753, Port Antonio, and *H. Sabdariffa*, L. (l. c.), Lucea, cultivated and apparently escaped.

Thespesia, "Soland." in Correa, Ann. Mus. ix. 1807.

T. POPULNEA, (L.) Corr. l. c. 1807. *Hibiscus*, L. Spec. 1753.
Nassau; Kingston; Grand Cayman.

Gossypium, L. Gen. 1737.

G. BARBADENSE, L. Spec. 1753.
Eleuthera; Fortune Is.; Port Antonio; Lucea; Grand Cayman.

A shrub as much as 8 feet high.

Xylon, L. Gen. 1737. *Ceiba*, Gærtn. Fr. 1781. *Eriodendron*, DC. Prod. i. 1824.

X. PENTANDRUM, (L.) OK. Rev. Gen. 1891. *Bombax pentandrum*, L. Spec. 1753. *Eriodendron anfractuosum*, DC. Prod. i. 1824.
Bog Walk.

Ochroma, Sw. Prod. 1788.

O. LAGOPUS, Sw. Prod. 1788.
Port Morant.

STERCULIACEÆ.

Helecteres, L. Gen. 1737.

H. JAMAICENSIS, Jacq. Pl. Carib. 1760.
Nassau; Eleuthera; Inagua; Grand Cayman.

H. SEMITRILOBA, Bert. in DC. Prod. i. 1824.
Inagua.

Melochia, L. Gen. 1737; Dill. Hort. Elth. 1732.

M. LUPULINA, Sw. Prod. 1788.
Port Morant.

M. NODIFLORA, Sw. Prod. 1788.
Nassau; Kingston (R.); Constant Springs; Bog Walk; Port Morant; Porus; Grand Cayman.

M. PYRAMIDATA, L. Spec. 1753.
Lucea.

M. TOMENTOSA, L. Syst. x. 1759.
Nassau; Eleuthera; Cat Is.

Var. CRENATA, (Vahl) Griseb. Fl. B. W. I. 1864.
Melochia, Vahl, Symb. iii. 1798.
Inagua.

Waltheria, L. Gen. 1737.

W. AMERICANA, L. Spec. 1753.

Nassau; Eleuthera; Cat Is.; Fortune Is.; Constant Springs; Lucea; Grand Cayman.

Theobroma Cacao, L. Spec. 1753. Port Morant, Cult.

Guazuma, Adans. Fam. 1763; Plum. Gen. 1703.

G. TOMENTOSA, HBK. Nov. Gen. v. 1821.

Constant Springs; Port Morant; Port Antonio; Lucea; Porus; Grand Cayman.

Ayenia, L. Syst. x. 1759.

A. PUSILLA, L. l. c.

Cat Is.

TILIACEÆ.

Triumfetta, L. Gen. 1737.

T. ALTHÆOIDES, Lam. Dict. iii. 1789.

Nassau; Eleuthera; Cat Is.; Lucea.

This species seems doubtfully distinct from *T. semitriloba.* I have placed under this species those forms having a denser and more velvety pubescence and the serrations of the leaves irregular, the longer teeth oblong, blunt and tending to be glandular tipped. I can see no constant difference in the fruit. *T. semitriloba* is described as having the prickles of the fruit glabrous, but in all the specimens examined the prickles are supplied with retrorse hairs (Smith, Guatam. 2023; Curtiss, Fla. 404, Garber, Fla.; Cuba, Wr. 43; Sintenis, Porto R. 17; Eggers, St. Thomas, 198).

T. LAPPULA, L. Spec. 1753.

Constant Springs; Port Morant; Grand Cayman.

T. SEMITRILOBA, Jacq. Pl. Carib. 1760.

Port Morant; Port Antonio; Porus; Lucea; Grand Cayman.

Corchorus, L. Gen. 1737; Tourn. Inst. 1700.

C. HIRSUTUS, L. Spec. 1753.

Eleuthera; Cat Is.; Watling's; Crooked Is.; Inagua.

C. SILIQUOSUS, L. Spec. 1753.

Nassau; Eleuthera; Kingston; Blue Mts. (R.); Bog Walk; Porus; Port Morant; Port Antonio; Grand Cayman.

LINEÆ.

Erythroxylum, P. Br. Hist. Jam. 1756.

E. BREVIPES, DC. Prod. i. 1824.
Fortune Is.

MALPIGHIACEÆ.

Malpighia, L. Gen. 1737; Plum. Gen. 1703.

M. ANGUSTIFOLIA, L. Spec. Ed. 2, 1762.
Grand Cayman.

M. GLABRA, L. Spec. 1753.
Port Morant; Lucea.

M. PUNICIFOLIA, L. Spec. Ed. 2, 1762.
Watling's.

M. SETOSA, Bert. in Spreng. N. Entd. iii. 1822.
Cat Is.

Bunchosia, Rich. and Juss. Ann. Mus. xviii. 1811.

B. MEDIA, (Jacq.) Rich. in Ann. Mus. l. c. *Malpighia*, Jacq. Pl. Carib. 1760.
Lucea.

Heteropteris, HBK. Nov. Gen. v. 1821.

H. LAURIFOLIA, (L.) Juss. Syn. Malpig. 1840 (Ann. Sc. Nat.). *Banisteria*, L. Spec. Ed. 2, 1762.
Constant Springs; Blue Mts.; Port Antonio.

Stigmaphyllon, A. Juss. in St. Hil. Fl. Bras. iii. 1833.

S. EMARGINATUM, (Cav.) Juss. Syn. Malp. 1840. *Banisteria*, Cav. Diss. ix. 1790.
Lucea.

Triopteris, L. Gen. 1737.

T. JAMAICENSIS, L. Spec. 1753.
Eleuthera; Cat Is.

ZYGOPHYLLEÆ.

Tribulus, L. Gen. 1737; Tourn. Inst. 1700.

T. CISTOIDES, L. Spec. 1753.
Fortune Is.; Kingston.

T. MAXIMUS, L. Spec. 1753.
Fortune Is.; Lucea.

Guaiacum, L. Gen. 1737; Plum. Gen. 1703.

G. OFFICINALE, L. Spec. 1753.
Kingston.

G. SANCTUM, L. Spec. 1753.
Fortune Is.; Crooked Is.

GERANIACEÆ.

Geranium, L. Gen. 1737; Tourn. Inst. 1700.

G. CAROLINIANUM, L. Spec. 1753 (fide Trelease).
Blue Mt. Peak.

Oxalis, L. Gen. 1737.

O. CORNICULATA, L. Spec. 1753 (fide Trelease).
Bog Walk; Nassau (repent var.).

O. MARTIANA, Zucc. Mon. 1825 (fide Trelease).
Kingston; Bog Walk.

RUTACEÆ.

Zanthoxylum, L. Hort. Cliff. 1737.

Z. CARIBÆUM, Lam. Dict. ii. 1786 (Cf. Ann. Sc. Nat. v. 14, p. 319).
Lucea.

Z. EMARGINATUM, (Sw.) Sw. Fl. Ind. Occ. i. 1797. *Fagara*, Sw. Prod. 1788. *Tobinia*, Desv.
Cat Is.; Inagua.

The Inagua specimens are very prickly, the leaflets often bearing long spines on the midrib beneath.

Z. FAGARA, (L.) Sarg. Gard. & For. iii. 1890. *Schinus*, L. Spec. 1753. *Z. Pterorata*, HBK. Nov. Gen. vi. 1823. *Fagara Pterorata*, L. Syst. x. 1759. *F. lentiscifolia*, Willd. Enum. 1809.
Nassau; Eleuthera; Cat Is.

Triphasia, Lour. Fl. Cochinch. i. 1790.

T. TRIFOLIATA, (L.) DC. Prod. i. 1824. *Limonia*, L. Mant. ii. 1771.
Grand Cayman.

Citrus, L. Gen. 1737.

C. AURANTIUM, L. Spec. 1753.

Var. SPINOSISSIMUM, (Mey.) Griseb. Fl. B. W. I. 1864. *Citrus*, Mey. Esseq. 1818.

Grand Cayman, extensively naturalized.

SIMARUBEÆ.

Suriana, L. Gen. 1737; Plum. Gen. 1703.

S. MARITIMA, L. Spec. 1753.

Nassau; Eleuthera; Cat Is. (R.); Crooked Is.; Grand Cayman.

BURSERACEÆ.

Bursera, Jacq. in L. Spec. Ed. 2, 1762.

Linnæus cites, "Jacq. Hist. t. 65," where one finds *Bursera gummifera*, but the date on the title page of this work is 1763. In regard to this see note by Sargent, Gard. & For. iii. p. 260.

B. ANGUSTATA, Wr. in Griseb. Cat. Pl. Cub. 1866.

Inagua.

B. SIMARUBA, (L.) Sarg. Gard. & For. iii. 1890. *Pistacia*, L. Spec. 1753. *Terebinthus Brownii*, Jacq. Pl. Carib. 1760. *Bursera gummifera*, Jacq. in L. Spec. Ed. 2, 1762; Stirp. Amer. 1763.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Grand Cayman.

Amyris, P. Br. Hist. Jam. 1756.

A. MARITIMA, Jacq. Pl. Carib. 1760.

Fortune Is.; Inagua (R.).

MELIACEÆ.

Melia, L. Gen. 1737.

M. SEMPERVIRENS, Sw. Prod. 1788.

Inagua; Grand Cayman. Cultivated and probably escaped.

Trichilia, P. Br. Hist. Jam. 1756.

T. HAVANENSIS, Jacq. Pl. Carib. 1760. *Portesia glabra*, Griseb. Fl. B. W. I. 1864.

Grand Cayman.

T. SPONDIOIDES, Jacq. Pl. Carib. 1760.
Constant Springs; Port Morant.

Swietenia, Jacq. Pl. Carib. 1760.

S. MAHAGONI, Jacq. l. c.
Nassau; Crooked Is.; Inagua; Grand Cayman.

Cedrela, P. Br. Hist. Jam. 1756.

C. ODORATA, L. Syst. x. 1759.
Jamaica.

ILICINEÆ.

Ilex, L. Gen. 1737.

I. MONTANA, (Sw.) Griseb. Pl. Wr. i. 1860. *Prinos*, Sw. Prod. 1788.
Blue Mt. Peak.

CELASTRACEÆ.

Maytenus, Juss. Gen. 1789.

M. BUXIFOLIUS, (Rich.) Griseb. Cat. Pl. Cub. 1866. *Monteverda*, Rich. Cuba, 1845–55.
Cat Is.; Crooked Is.

Crossopetalum, P. Br. Jam. 1756. *Myginda*, Jacq. Pl. Carib. 1760.

C. AQUIFOLIUM, (Griseb.). *Myginda aquifolia*, Griseb. Cat. Pl. Cuba, 1866.
Eleuthera.

C. RHACOMA, (Sw.). *Rhacoma Crossopetalum*, L. Syst. x. 1759. *Myginda Rhacoma*, Sw. Prod. 1788.
Cat Is.; Watling's; Crooked Is.; Fortune Is.; Inagua; Lucea; Grand Cayman.

Schæfferia, Jacq. Pl. Carib. 1760.

S. FRUTESCENS, Jacq. l. c. (fide Trelease).
Eleuthera.

Elæodendrum, Murr. Syst. 1784.

E. ATTENUATUM, Rich. Cub. 1845.
Grand Cayman.

RHAMNEÆ.

Rhamnidium, Reissek in Mart. Fl. Bras. xciv. 1861.

R. REVOLUTUM, Wr. in Griseb. Cat. Pl. Cub. 1866.
Watling's.

Colubrina, Rich. in Brongn. Ann. Sci. Nat. x. 1827.

C. FERRUGINOSA, Brongn. l. c. *Rhamnus Colubrina*, Jacq. Pl. Carib. 1760.
Grand Cayman.

C. CUBENSIS, (Jacq.) Brongn. l. c. *Rhamnus*, Jacq. Pl. Carib. 1760.
Grand Cayman.

Reynosia, Griseb. Cat. Pl. Cuba, 1866.

R. LATIFOLIA, Griseb. l. c.
Eleuthera; Cat Is.

AMPELIDEÆ.

Vitis, L. Gen. 1737; Tourn. Inst. 1700.

V. CARIBÆA, DC. Prod. i. 1824.
Blue Mts.

V. ROTUNDIFOLIA, Michx. Fl. 1803.
Nassau.

Cissus, L. Fl. Zeyl. 1747.

C. RHOMBIFOLIA, Vahl, Eclog. ii. 1798.
Nassau; Eleuthera; Cat Is.

I have followed Planchon (Ampel. in DC. Mon. Phaen.) because of the confusion in the earlier names. It would seem better to apply the name *trifoliata*, to *C. acida*, L. Spec. Ed. 2, 1762 = *Sicyos trifoliata*, L. Spec. 1753.

C. SICYOIDES, L. Syst. x. 1759.
Nassau; Port Antonio; Lucea.

SAPINDACEÆ.

Seriania, Schum. in Act. Soc. Hafn. iii. 2, 1794. *Serjania*, Juss. Ann. Mus. xviii. 1811; Plum. Gen. 1703.

S. LUCIDA, Schum. l. c.
Eleuthera; Cat Is.

S. PANICULATA, HBK. Nov. Gen. v. 1821.
Eleuthera; Cat Is.

Cardiospermum, L. Gen. 1737.

C. GRANDIFLORUM, Sw. Prod. 1788.
Blue Mts.

C. HALICACABUM, L. Spec. 1753.
Nassau; Lucea; Grand Cayman.

Paullinia, L. Gen. 1737.

P. CURASSAVICA, L. Spec. 1753.
Port Morant.

Allophyllus, L. Fl. Zeyl. 1747. *Schmidelia*, L. Mant. i. 1767.

A. sp.
Grand Cayman.

Near *Schmidelia occidentalis*, Sw.; leaflets 3, leathery, elliptical, shortly petiolulate, sharply and rather remotely serrate, glabrous and shining above, sparsely pubescent beneath, 4 to 7 cm. long by 1½ to 3 cm. broad, nerves straightish and prominent beneath; petioles 1½ to 4 cm. long, sparsely appressed pubescent; fruit globose or slightly obovoid, much smaller than in *S. occidentalis*, about 4 mm. long.

Cupania, L. Gen. 1737; Plum. Gen. 1703.

C. AMERICANA, L. Spec. 1753.
Port Morant.

Blighia sapida, Kœnig, Ann. Bot. ii. 1806. Kingston; Lucea, cultivated.

Thyana, Hamilt. Prod. Fl. Ind. Occ. 1825. *Thouinia*, Poit. in Ann. Mus. iii. 1804 (not Thunb. in L. f. Suppl. 1781 = *Linociera*, Sw. in Schreb. Gen. ii. 1791.)

Thyana from its derivation would, according to some authors, be discarded.

T. DISCOLOR, (Griseb.). *Thouinia discolor*, Griseb. Fl. B. W. I. 1864.
Nassau; Eleuthera; Cat Is.; Fortune Is.; Inagua.

Melicoccus, P. Br. Hist. Jam. 1756.

M. BIJUGA, L. Spec. Ed. 2, 1762. (Melicocca).
Port Antonio; Lucea.

Dodonæa, L. Gen. 1737; Plum. Gen. 1703.

D. ANGUSTIFOLIA, Sw. Obs. 1791.
Blue Mt. Peak.

D. VISCOSA, L. Mant. ii. 1771.
Port Royal.

Var. OBOVATA, n. var.
Cat Is.; Inagua.

Leaves obovate, truncate or slightly pointed at apex, frequently ashy with resinous dots, veins inconspicuous

Alvaradoa, Liebm. in Vidensk. Meddel. 1853.

A. AMORPHOIDES, Liebm. l. c.
Nassau; Grand Cayman.

ANACARDIACEÆ.

Rhus, L. Gen. 1737; Tourn. Inst. 1700.

R. METOPIUM, L. Amoen. Acad. v. 1760.
Nassau; Grand Cayman.

Mangifera, L. Fl. Zeyl. 1747.

M. INDICA, L. Spec. 1753.
Blue Mts.; Lucea; Grand Cayman. Cultivated and escaped.

Anacardium, L. Gen. 1737.

A. OCCIDENTALE, L. Spec. 1753.
Lucea.

Spondias, L. Gen. 1737.

S. MOBIN, L. Spec. 1753. *S. purpurea*, L. Spec. Ed. 2, 1762.
Lucea. Probably cultivated.

S. MYROBALANUS, L. Syst. x. 1759. *S. lutea*, L. Spec. Ed. 2, 1762.
Lucea.

Jacquin (Stirp. Amer.) seems to have reversed the names of these two species.

MORINGEÆ.

Moringa, Burm. Fl. Zeyl. 1737.

M. PTERYGOSPERMA, Gærtn. Fr. ii. 1791; *Guilandina Moringa*, L. Spec. 1753.

Bog Walk; Port Royal; Grand Cayman; Porus.

LEGUMINOSÆ.

Crotalaria, L. Gen. 1737; Tourn. Inst. 1700.

C. INCANA, L. Spec. 1753.

Bog Walk; Pt. Morant; Lucea; Gr. Cayman; Porus.

C. JUNCEA, L. Spec. 1753.

Constant Springs.

C. PUMILA, Ort. Dec. ii. 1797–1800.

Nassau; Eleuthera; Cat Is.

C. RETUSA, L. Spec. 1753.

Kingston.

C. RETZII. *C. sericea*, Retz. Obs. iii. 1779–91 (not Burm. Fl. Ind. 1768, fide DC. Prod. ii. p. 126).

Lucea.

C. STRICTA, DC. Prod. ii. 1825.

Blue Mt. Peak; Lucea.

C. VERRUCOSA, L. Spec. 1753.

Nassau; Kingston (R.); Port Royal; Lucea.

Trifolium, L. Gen. 1737; Tourn. Inst. 1700.

T. FILIFORME, L. Spec. 1753.

Blue Mt. Peak.

T. REPENS, L. Spec. 1753.

Blue Mt. Peak.

Indigofera, L. Hort. Cliff. 1737.

I. ANIL, L. Mant. ii. 1771.

Nassau; Eleuthera; Inagua; Kingston; Grand Cayman; Porus.

I. SUBULATA, Vahl in Poir. Suppl. iii. 1813.

Constant Springs; Port Morant; Porus.

I. TINCTORIA, L. Spec. 1753.

Kingston.

Colinil, Adans. Fam. 1763. *Tephrosia*, Pers. Syn. ii. 1807.

C. ROSEUM, (Lam.). *Galega rosea*, Lam. Dict. ii. 1786. *Tephrosia grandiflora*, Pers. Syn. ii. 1807.
Blue Mt. Peak.

C. CINEREUM, (L.). *Galega cinerea*, L. Syst. x. 1759. *Tephrosia cinerea*, Pers. Syn. ii. 1807.
Eleuthera; Grand Cayman.

Agati, Adans. Fam. 1763. *Sesban*, Adans. l. c. *Sesbania*, Scop. Introd. 1777.

Poiret (Dict. vii.), uses *Sesban* and enumerates several species.

A. GRANDIFLORA, (L.) Desv. Journ. Bot. iii. 1813. *Æschynomene*, L. Spec. Ed. 2, 1763. *Sesban grandiflorus*, Poir. l. c. 1806.
Fortune Is.

A. SERICEA, (Willd.). *Coronilla sericea*, Willd. Enum. 1809. *Sesbania*, DC. Prod. ii. 1825.
Nassau; Kingston. Cultivated?

Brya, P. Br. Hist. Jam. 1756.

B. EBENUS, (L.) DC. Prod. ii. 1825. *Aspalathus*, L. Syst. x. 1759.
Blue Mts; Porus.

Æschynomene, L. Gen. 1737.

Æ. AMERICANA, L. Spec. 1753.
Constant Springs; Port Morant; Port Antonio; Lucea; Porus.

Stylosanthes, Sw. Prod. 1788.

S. HAMATA, (L.) Taub. Abh. Bot. Ver. Brandenb. xxxii. 1889. *Hedysarum*, L. Spec. 1753. *S. procumbens*, Sw. Prod. 1788.
Nassau; Eleuthera; Fortune Is.; Inagua; Kingston; Port Morant; Grand Cayman.

Desmodium, Desv. Journ. Bot. iii. 1813.

D. ADSCENDENS, (Sw.) DC. Prod. ii. 1825. *Hedysarum*, Sw. Prod. 1788.
Port Antonio.

D. AXILLARE, (Sw.) DC. l. c. *Hedysarum*, Sw. l. c.
Bog Walk; Port Antonio.

D. INCANUM, (Sw.) DC. l. c. *Hedysarum*, Sw. l. c.
Nassau; Eleuthera; Cat Is.; Kingston; Constant Springs; Bog Walk; Port Morant; Port Antonio (R.); Grand Cayman; Porus.

D. PROCUMBENS, (Mill.). *Hedysarum procumbens*, Mill. Dict. 1768. *D. spirale*, DC. l. c. *Hedysarum*, Sw. l. c.
Kingston; Lucea.

D. SCORPIURUM, (Sw.) Desv. l. c. 1813. *Hedysarum*, Sw. l. c.
Port Antonio; Lucea.

D. TRIFLORUM, (L.) DC. l. c. *Hedysarum*, L. Spec. 1753.
Constant Springs; Port Antonio; Lucea.

D. UNCINATUM, (Jacq.) DC. l. c. *Hedysarum*, Jacq. Hort. Schœnb. iii. 1798.
Blue Mt. Peak.

Lourea, Neck. Elem. Bot. iii. 1790.

L. VESPERTILIONIS, (L. f.) Desv. Jour. Bot. iii. 1813. *Hedysarum*, L. f. Suppl. 1781.
Constant Springs.

Alysicarpus, Neck. Elem. Bot. iii. 1790.

A. VAGINALIS, (L.) DC. Prod. ii. 1825. *Hedysarum*, L. Spec. 1753.
Constant Springs; Bog Walk; Port Morant.

Abrus, L. Hort. Cliff, 1737.

A. PRECATORIUS, L. Syst. Ed. 12, 1767. *Glycine Abrus*, L. Spec. 1753.
Constant Springs; Port Morant; Lucea.

Centrosema, (DC.) Benth. Ann. Wien. Mus. ii. 1838. *Clitoria*, Sect., DC. Prod. ii. 1825. *Cruminium*, Desv. in Ann. Sc. Nat. 1826.

C. PUBESCENS, Benth. l. c.
Constant Springs; Port Morant.

C. PLUMIERI, (Turp.) Benth. l. c. *Clitoria*, Turp. in Pers. Syn. ii. 1807.
Bog Walk; Port Morant; Lucea.

C. VIRGINIANUM, (L.) Benth. l. c. *Clitoria*, L. Spec. 1753.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Inagua; Constant Springs; Porus.

Var. ANGUSTIFOLIUM, (DC.) Griseb. Fl. B. W. I. 1864. *Clitoria Virginiana*, var., DC. Prod. ii. 1825.

Nassau; Cat Is.

Clitoria, L. Gen. 1737.

C. TERNATEA, L. Spec. 1753.

Inagua; Kingston; Grand Cayman.

Teramnus, P. Br. Hist. Jam. 1756.

T. UNCINATUS, (L.) Sw. Prod. 1788. *Dolichos*, L. Spec. Ed. 2, 1763.

Nassau; Bog Walk; Port Morant; Lucea; Grand Cayman.

T. VOLUBILIS, Sw. Prod. 1788.

Blue Mts. (R.); Port Morant; Lucea.

Erythrina, L. Gen. 1737.

E. CORALLODENDRON, L. Spec. 1753.

Lucea; Grand Cayman.

Mucuna, Adans. Fam. 1763.

M. PRURIENS, (L.) DC. Prod. ii. 1825. *Dolichos*, L. Syst. x. 1759.

Bog Walk; Grand Cayman; Porus.

Galactia, P. Br. Hist. Jam. 1756.

G. ANGUSTIFOLIA, Kunth, Mim. 1819.

Inagua.

G. GALACTIOIDES, (Griseb.). *Dioclea galactioides*, Griseb. Cat. Pl. Cub. 1866. *G. impressa*, Wr. in Wr. and Sauv. Fl. Cub. 1873.

Watling's; Crooked Is.; Fortune Is.; Inagua.

Stem slightly rusty-pubescent; leaflets 3, elliptical, oblanceolate or obovate, coriaceous, reticulate veined, glabrous and pale green both sides, narrowed at base, obtuse or retuse at apex, margin slightly revolute, 2½ cm. long by 1½ cm. broad or smaller, petiolules rusty-pubescent; petiole ½ to 3 cm. long; flowers fascicled racemose, inflorescence 8

to 6 cm. long, appressed, rusty-pubescent, pedicels about 4 mm. long; calyx rusty-pubescent, lateral lobes ovate, as long as the tube, upper and lower longer and mucronate; corolla about twice the length of the lateral lobes, purple; flower 6 to 10 mm. long; vexillar stamen united for about ⅔ its length; pod compressed, glabrous, obliquely beaked, 3 to 4 cm. long; seeds dark brown, smooth. The leaves and pods, under a lens are sparsely hirsute. The leaves are wider than in Wright's Cuba specimen in Herb. Cambridge. They do not agree altogether with the description of *Dioclea galactioides* in Griseb. Cat. Pl. Cub. "foliolis subtus puberulis sericeis" and "legumine rufo-pubescente."

G. RUDOLPHIOIDES, (Griseb.) Wr. in Wr. & Sauv. Fl. Cub. 1873. *Dioclea*, Griseb. Pl. Wr. i. 1860.

Nassau; Eleuthera; Cat Is.; Crooked Is.

G. TENUIFLORA, (Willd.) Wight & Arn. Prod. Fl. Ind. 1834. *Glycine*, Willd. Spec. iii. 1801. *G. filiformis*, Benth. in Ann. Wien. ii. 1838.

Nassau; Watling's; Inagua.

Canavali, Adans. Fam. 1763. *Canavalia*, DC. Prod. ii. 1825.

C. GLADIATA, (Savi) DC. l. c. "*Malocchia*, Savi, Mem. 1825, p. 4" (ex DC. l. c.).

Nassau; Grand Cayman.

C. OBTUSIFOLIA, (Lam.) DC. l. c. *Dolichos*, Lam. Dict. ii. 1786.

Nassau; Eleuthera; Kingston.

Phaseolus, L. Gen. 1737; Tourn. Inst. 1700.

P. SEMIERECTUS, L. Mant. i. 1767.

Nassau; Constant Springs; Kingston (R.); Port Morant; Grand Cayman; Porus.

Vigna, Savi, Mem. Phas. iii. 1824.

V. LUTEOLA, (Jacq.) Benth. in Mart. Fl. Bras. xv. 1859. *Phaseolus*, Jacq. Hort. Vind. i. 1770.

Kingston; Port Morant; Lucea; Grand Cayman.

Dolichos, L. Gen. 1737.

D. LABLAB, L. Spec. 1753.

Nassau; Port Antonio. Cultivated and escaped.

Cajan, Adans. Fam. 1763. *Cajanus*, DC. Cat. H. Monsp. 1813.

C. INDICUS, Spreng. Syst. iii. 1826 (Cajanus). *Cytisus Cajan*, L. Spec. 1753.

Eleuthera; Port Antonio; Lucea; Grand Cayman.

Rhynchosia, Lour. Fl. Cochinch. ii. 1790.

R. MINIMA, (L.) DC. Prod. ii. 1825. *Dolichos*, L. Spec. 1753.

Inagua; Grand Cayman.

Flemingia, Roxb. Pl. Corom. iii. 1819.

The date of this is given in Pfeiffer's Index as 1819? and in Pritzel as 1819; but it is evidently earlier, as it is quoted in Ait. f. Hort. Kew. iii. p. 350, 1812.

F. STROBILIFERA, (L.) Ait. f. Hort. Kew. iii. 1812. *Hedysarum*, L. Spec. 1753.

Bog Walk; Port Antonio (R.).

Amerimnon, P. Br. Hist. Jam. 1756. *Dalbergia*, L. f. Suppl. 1781.

A. BROWNII, Jacq. Pl. Carib. 1760. *D. Amerimnum*, Benth. Syn. Dalb. 1860.

Port Morant; Lucea.

Ecastophyllum, P. Br. Hist. Jam. 1756.

E. BROWNEI, Pers. Syn. ii. 1807. *Pterocarpus Ecastophyllum*, L. Syst. Ed. 13, 1774.

Port Antonio; Grand Cayman.

Ichthyomethia, P. Br. Hist. Jam. 1756. *Piscidia*, L. Syst. x. 1759.

I. PISCIPULA, (L.) Hitchc. in Gard. & For. iv. 1891. *Erythrina*, L. Spec. 1753. *Piscidia Erythrina*, L. Syst. x. 1759. *P. Piscipula*, Sarg. Gard. & For. iv. 1891.

Cat Is.; Lucea.

Vouacapoua, Aubl. Gui. i. 1775. *Andira*, Lam. Dict. i. 1783.

V. AMERICANA, Aubl. l. c. *Geoffræa inermis*, Sw. Prod. 1788. *Andira*, HBK. Nov. Gen. vi. 1823.

Port Antonio; Lucea.

Sophora, L. Gen. 1737.

S. TOMENTOSA, L. Spec. 1753.
Crooked Is.; Inagua.

Ateleia, (Moç. & Sess.) Benth. in Ann. Wien. Mus. ii. 1838. *Pterocarpus*, Sect., Moç. & Sess. in DC. Prod. ii. 1825.

A. MULTIJUGA, (Rich.). *Swartzia multijuga*, Rich. Cub. 1845–55. *A. Cubensis*, Griseb. Pl. Wr. i. 1860.
Cat Is.

Cæsalpinia, L. Gen. Ed. 2, 1742. *Guilandina*, L. Gen. 1737.

C. BONDUCELLA, (L.). *Guilandina*, L. Spec. Ed. 2, 1762.
Nassau; Eleuthera; Inagua; Lucea; Blue Mts.; Grand Cayman.

C. CRISTA, L. Spec. 1753.
Nassau; Inagua.

C. PULCHERRIMA, (L.) Sw. Obs. 1791. *Poinciana pulcherrima*, L. Spec. 1753.
Lucea; Grand Cayman; Porus.

C. SEPIARIA, Roxb. Fl. Ind. ii. 1832.
Blue Mts.; Port Antonio; Porus.

Hæmatoxylum, L. Gen. 1737. *Hœmatoxylon*, L. Phil. Bot. 1751.

H. CAMPECHIANUM, L. Spec. 1753.
Constant Springs; Port Morant; Lucea; Grand Cayman; Porus.

Poinciana regia, Boj. in Bot. Mag. 1829. Nassau, Cult.
Parkinsonia aculeata, L. Spec. 1753. Kingston, Cult.

Cassia, L. Gen. 1737; Tourn. Inst. 1700.

C. ALATA, L. Spec. 1753.
Port Royal; Lucea.

C. BAHAMENSIS, Mill. Dict. 1768.
Nassau; Eleuthera; Cat Is.; Watling's; Port Morant.

C. BICAPSULARIS, L. Spec. 1753.
Port Morant; Port Antonio; Lucea; Porus.

C. BIFLORA, L. Spec. 1753.
Nassau; Eleuthera; Fortune Is.; Inagua; Constant Springs.

C. EMARGINATA, L. Spec. 1753.
Kingston.

C. HIRSUTA, L. Spec. 1753.
Port Antonio.

C. NICTITANS, L. Spec. 1753.
Nassau; Eleuthera; Porus.

C. OCCIDENTALIS, L. Spec. 1753.
Nassau; Eleuthera; Fortune Is.; Inagua; Grand Cayman; Porus.

C. PILOSA, L. Syst. x. 1759.
Constant Springs.

C. POLYADENA, DC. "Pl. Rar. Gard. Gen. 2e Rapp."
Eleuthera; Cat Is.; Crooked Is.

C. TORA, L. Spec. 1753.
Eleuthera; Constant Springs; Porus.

C. UNIFLORA, Mill. Dict. 1768 (not Spreng. N. Entd. 1820).
C. sericea, Sw. Prod. 1788.
Nassau; Inagua.

C. VILLOSA, Houst. in Mill. Dict. 1768.
Nassau.
Peculiar in its Desmodium-like pods.

C. VIMINEA, L. Syst. x. 1759.
Blue Mt. Peak.

Bauhinia, L. Gen. 1737; Plum. Gen. 1703.

B. DIVARICATA, L. (Ex Urb. Jahrb. Berl. Gart., p. 247.) *B. porrecta*, Sw. Prod. 1788. *Casparea*, Griseb. Fl. B. W. I. 1864.
Port Antonio; Grand Cayman; Porus.

B. KRUGII, Urb. Ber. D. Bot. Ges. iii. 1885. (Sintenis, Pl. Porto Rico, No. 682, 5005). Lucea (cultivated?)

Tamarindus, L. Gen. 1737; Tourn. Inst. 1700.

T. INDICA, L. Spec. 1753.
Nassau; Inagua; Constant Springs; Porus.

Hymenæa, L. Gen. 1737; Spec. 1753.

H. COURBARIL, L. Spec. 1753.
Porus.

Gigalobium, P. Br. Hist. Jam. 1756. *Entada*, Adans. Fam. 1763.

G. SCANDENS, (L.). *Mimosa scandens*, L. Spec. Ed. 2, 1763. *Entada*, Benth. in Hook. Jour. Bot. iv. 1842.
Port Antonio.

Adenanthera, L. Coroll. 1737.

A. PAVONINA, L. Spec. 1753.
Port Antonio; Grand Cayman.

Prosopis, L. Mant. i. 1767.

P. JULIFLORA, (Sw.) DC. Prod. ii. 1825. *Mimosa*, Sw. Prod. 1788.
Kingston; Constant Springs.

Desmanthus, Willd. Spec. iv. 1805.

D. DEPRESSUS, Humb. & Bonpl. in Willd. Spec. iv. 1805.
Inagua; Kingston.

D. VIRGATUS, (L.) Willd. Spec. iv. 1805. *Mimosa*, L. Spec. 1753.
Nassau, Eleuthera; Port Morant.

Mimosa, L. Gen. 1737; Tourn. Inst. 1700.

M. BAHAMENSIS, Benth. in Hook. Jour. Bot. iv. 1842.
Fortune Is.; Inagua.

M. PIGRA, L. Syst. x. p. 1312, No. 28, F. 1759. *M. asperata*, L. l. c., p. 1312, No. 28, G.
Lucea.

The pods break up into 1-seeded burs.

M. PUDICA, L. Spec. 1753.
Bog Walk; Port Morant; Porus; Lucea (var. unijuga).

Observations at Lucea showed that the leaves recovered from a shock in 9 to 11 minutes.

Leucæna, Benth. in Hook. Jour. Bot. iv. 1842.

L. GLAUCA, (L.) Benth. l. c. *Mimosa*, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Fortune Is.; Port Morant; Lucea; Grand Cayman.

Acacia, L. Fl. Zeyl. 1747; Tourn. Inst. 1700.

A. FARNESIANA, (L.) Willd. Spec. iv. 1805. *Mimosa*, L. Spec. 1753.
Nassau; Fortune Is.; Inagua; Lucea.

A. LEBBECK, (L.) Willd. l. c. *Mimosa*, L. l. c.
Nassau.

A. LUTEA, (Houst.). *Mimosa lutea*, Houst. in Mill. Dict. 1768. *Acacia macrantha*, Humb. & Bonpl. in Willd. l. c.
Constant Springs.

A. NILOTICA, (L.) Desf. Cat. H. Par. Ed. 2, 1815. *Mimosa*, L. Spec. 1753. *A. Arabica*, Willd. l. c.
Lucea.

A. TORTUOSA, (L.) Willd. l. c. *Mimosa*, L. Syst. x. 1759.
Port Royal.

Lysiloma, Benth. in Hook. Lond. Jour. Bot. iii 1844.

L. FORMOSA, (Rich.). *Acacia formosa*, Rich. Fl. Cub. 1845 (–55?) (not *A. formosa*, Kunth, Mim. 1819 = *Calliandra formosa*, Benth. l. c. ex Benth. Mim. in Linn. Trans. xxx., p. 534). *L. Sabicu*, Benth. in Hook. Kew Jour. vi. 1854.
Nassau; Eleuthera; Fortune Is.

L. LATISILIQUA, (L.) Benth. in Trans. Linn. Soc. xxx. 3, 1875. *Mimosa*, L. Spec. 1753.
Cat Is.; Fortune Is.; Inagua.

Calliandra, Benth. in Hook. Jour. Bot. ii. 1840.

C. GRACILIS, Griseb. Pl. Wr. i. 1860.
Eleuthera; Cat Is.; Grand Cayman.

C. HÆMATOMMA, (DC.) Benth. in Hook. Lond. Jour. iii. 1844. *Acacia*, DC. Mem. Leg. 1825.
Inagua.

C. PORTORICENSIS, (Jacq.) Benth. l. c. 1844. *Mimosa*, Jacq. Ic. Rar. iii. 1786–93.
Blue Mts.

Pithecolobium, Mart. Cat. H. Monac. 1829.

P. ASPLENIFOLIUM, Griseb. Cat. Pl. Cub. 1866.
Eleuthera.

P. FILICIFOLIUM, Benth. in Hook. Lond. Jour. iii. 1844.
Lucea.

P. SAMAN, (Willd.) Benth. l. c. *Inga*, Willd. Spec. iv. 1807. *Calliandra*, Griseb. Fl. B. W. I. 1864.
Lucea; Porus.

Willdenow quotes *Mimosa Inga*, Jacq. Frag. v.

P. UNGUIS-CATI, (L.) Benth. l. c. *Mimosa*, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Fortune Is.

Inga, Willd. Spec. iv. 1807; Plum. Gen. 1703.

I. VERA, Willd. l. c. *Mimosa Inga*, L. Spec. 1753.
Port Morant.

ROSACEÆ.

Chrysobalanus, L. Gen. 1737.

C. ICACO, L. Spec. 1753.
Nassau; Grand Cayman.

Rubus, L. Gen. 1737; Tourn. Inst. 1700.

R. ALPINUS, Macf. (ex Griseb. Fl. B. W. I. 1864.)
Blue Mt. Peak.

This probably appeared in Macf. Fl. Jam. Vol. ii., which was not completely published. Cf. Jour. Bot. & Kew Misc. ii. p. 288.

R. JAMAICENSIS, L. Mant. i. 1767.
Blue Mt. Peak.

Fragaria, L. Gen. 1737; Tourn. Inst. 1700.

F. VESCA, L. Spec. 1753.
Blue Mt. Peak.

SAXIFRAGACEÆ.

Windmannia, P. Br. Hist. Jam. 1756. *Weinmannia*, L. Syst. x. 1759.

W. PINNATA, L. Syst. x. 1759.
Blue Mt. Peak.

CRASSULACEÆ.

Bryophyllum, Salisb. Parad. Lond. i. 1805.

B. PINNATUM, (Lam.) S. Kurz, 1876. *Cotyledon pinnatum*,

Lam. Dict. ii. 1786. *B. calycinum*, Salisb. l. c.
Nassau; Blue Mts.; Grand Cayman.

RHIZOPHOREÆ.

Rhizophora, L. Gen. 1737.

R. MANGLE, L. Spec. 1753.
Cat Is.; Crooked Is.; Port Morant; Grand Cayman.

COMBRETACEÆ.

Buceras, P. Br. Hist. Jam. 1756. *Terminalia*, L. Mant. i. 1767.

B. ANGUSTIFOLIA, (DC.). *Bucida angustifolia*, DC. Prod. iii. 1828. *Bucida Buceras*, L. Syst. x. 1759.
Inagua.

B. CATAPPA, (L.). *Terminalia Catappa*, L. Mant. i. 1767.
Nassau; Fortune Is.; Grand Cayman.

Conocarpus, L. Gen. 1737.

C. ERECTA, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Crooked Is.; Inagua; Kingston; Lucea; Grand Cayman.
Var. SERICEA, Fors. in DC. Prod. iii. 1828.
Nassau; Watling's.

Laguncularia, Gærtn. Fr. iii. 1805.

L. RACEMOSA, (L.) Gærtn. l. c. *Conocarpus*, L. Syst. x. 1759.
Fortune Is.; Port Morant; Port Antonio.

MYRTACEÆ.

Psidium, L. Gen. 1737.

P. GUAJAVA, L. Spec. 1753.
Inagua (R.); Constant Springs; Bog Walk; Port Morant; Grand Cayman.

Pimenta, Lindl. Coll. Bot. 1821.

P. VULGARIS, Wight, Ill. Ind. Bot. ii. 1850. *Myrtus Pimenta*, L. Spec. 1753. *Pimenta Pimenta*, Cockerell in Torr. Bull. xix. p. 95, 1892.
Lucea.

Eugenia, L. Gen. 1737; Mich. Nov. Pl. Gen. 1729.

E. BARNENSIS, Jacq. Pl. Carib. 1760.

Grand Cayman.

E. BUXIFOLIA, (Sw.) Willd. Spec. ii. 1799. *Myrtus*, Sw. Prod. 1788.

Nassau; Cat Is.; Crooked Is.

E. JAMBOS, L. Spec. 1753.

Port Antonio.

E. MONTICOLA, (Sw.) DC. Prod. iii. 1828. *Myrtus*, Sw. l. c.

Nassau; Eleuthera; Grand Cayman.

MELASTOMACEÆ.

Nepsera, Naud. in Ann. Sc. Nat. 3, xiii. 1849.

N. AQUATICA, (Aubl.) Naud. l. c. *Melastoma*, Aubl. Guiana, 1775.

Port Antonio.

Miconia, Ruiz & Pav. Prod. 1798.

M. IMPETIOLARIS, (Sw.) Don, Mem. Soc. Wern. iv. 1823. *Melastoma*, Sw. Prod. 1788.

Port Antonio.

M. LÆVIGATA, (L.) DC. Prod. iii. 1828. *Melastoma*, L. Syst. x. 1759.

Bog Walk; Port Morant; Port Antonio; Lucea.

M. QUADRANGULARIS, (Sw.) Naud. in Ann. Sc. Nat. 3, xvi. 1851. *Melastoma*, Sw. Prod. 1788. *Pleurochœnia*, Griseb. Fl. B. W. I. 1864.

Blue Mt. Peak.

M. RIGIDA, (Sw.) Triana, Melast. *Melastoma*, Sw. l. c. *Pleurochœnia*, Griseb. Fl. B. W. I. 1864.

Blue Mt. Peak.

M. RUBENS, (Sw.) Naud. l. c. *Melastoma*, Sw. l. c. *Cremanium*, DC. Prod. iii. 1828.

Blue Mt. Peak.

Heterotrichum, DC. Prod. iii. 1828.

H. PATENS, (Sw.) DC. l. c. *Melastoma*, Sw. Prod. 1788.

Port Antonio.

Tetrazygia, Rich. in DC. Prod. iii. 1828.

T. BICOLOR, (Mill.) Cogn. in DC. Mon. Phan. vii. 1891. *Melastoma*, Mill. Dict. 1768. Wr. Pl. Cub. No. 1222. Cooper, Pl. N. Providence, No. 82.
Nassau.

T. HISPIDA, (Sw.) "Macf. Fl. Jam. ii." (ex. Cogn. in DC. Mon. Phan.) *Melastoma*, Sw. Prod. 1788. *Heterotrichum*, Griseb. Fl. B. W. I. 1864.
Blue Mt. Peak.

Clidemia, Don, in Mem. Soc. Wern. iv. 1823.

C. HIRTA, (L.) Don, l. c. *Melastoma*, L. Spec. 1753.
Port Antonio.

Mecranium, Hook. f. in Benth. & Hook. Gen. Pl. i. 3. 1867.

M. AMYGDALINUM, (Desr.) Triana, Melast. *Melastoma*, Desr. in Lam. Dict. iv. 1797.
Blue Mt. Peak.

M. PURPURASCENS, (Sw.) Triana, Melast. *Melastoma*, Sw. Prod. 1788.
Port Antonio.

LYTHRARIEÆ.

Ammannia, L. Gen. 1737.

A. LATIFOLIA, L. Spec. 1753.
Port Antonio; Lucea; Grand Cayman.

Parsonsia, P. Br. Hist. Jam. p. 199, 1756. *Cuphea*, P. Br. l. c. p. 216.

P. RADICANS, (Macf.). *Lythrum Parsonsia*, L. Syst. x. 1759. *Cuphea Parsonsia*, R. Br. (Mem. Soc. Wern. i. 1809?) *Cuphea radicans*, Macf. Fl. Jam.
Nassau; Port Morant.

P. MICROPETALA, (HBK.). *Cuphea*, HBK. Nov. Gen. vi. 1823. *C. platycentra*, Benth. Pl. Hartw. 1839.
Blue Mt. Peak.

Lawsonia inermis, L. Spec. 1753. Inagua, Lucea, Cult.

ONAGRARIEÆ.

Jussieua, L. Gen. 1737.

J. ANGUSTIFOLIA, Lam. Dict. iii. 1789.
Port Antonio.

J. HIRTA, (L.) Vahl, Eclog. ii. 1798. *Oenothera*, L. Syst. x. 1759.
Port Antonio.

J. REPENS, L. Spec. 1753.
Port Morant.

J. SUFFRUTICOSA, L. Spec. 1753.
Port Morant; Port Antonio.

J. VARIABILIS, Mey. Esseq. 1818.
Port Antonio.

SAMYDACEÆ.

Casearia, Jacq. Pl. Carib. 1760.

C. RAMIFLORA, Vahl, Symb. ii. 1791.
Lucea.

C. SERRULATA, Sw. Fl. Ind. Occ. ii. 1800.
Port Antonio.

C. SYLVESTRIS, Sw. l. c.
Port Morant.

Bonara, Aubl. Guiana, 1775.

B. RETICULATA, Griseb. Cat. Pl. Cub. 1866.
Nassau.

LOASEÆ.

Mentzelia, L. Gen. 1737; Plum. Gen. 1703.

M. ASPERA, L. Spec. 1753.
Kingston.

TURNERACEÆ.

Turnera, L. Gen. 1737; Plum. Gen. 1703.

T. DIFFUSA, Willd. in R. & S. Syst. vi. 1820. *T. microphylla*, Desv. in Hamilton, Prod. 1825. *Triacis*, Griseb. Fl. B. W. I. 1864.
Inagua.

T. ULMIFOLIA, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Fortune Is.; Constant Springs; Port Morant; Lucea (R); Grand Cayman.

PASSIFLOREÆ.

Passiflora, L. Gen. 1737.

P. ANGUSTIFOLIA, Sw. Prod. 1788.
Lucea; Grand Cayman.

P. CILIATA, Ait. Hort. Kew. iii. 1789.
Var. RIPARIA, Wr. in Griseb. Cat. Pl. Cub. 1866.
Eleuthera (R); Cat Is.; Fortune Is.

P. CUPRÆA, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.

P. EDULIS, Sims, Bot. Mag. 1818.
Blue Mt. Peak.

P. FŒTIDA, L. Spec. 1753.
Nassau; Bog Walk; Porus.

P. maliformis, L. Spec. 1753. Lucea, cult.

P. MINIMA, L. Spec. 1753.
Nassau; Eleuthera; Inagua; Port Antonio; Porus.

P. PALLIDA, L. Spec. 1753. Wr. Pl. Cub. No. 2597.
Cat Is.

P. RUBRA, L. Spec. 1753.
Bog Walk; Blue Mts.; Port Antonio; Lucea; Porus.

P. SEXIFLORA, Juss. in Ann. Mus. vi. 1805.
Blue Mts.

P. VILLOSA, Macf. (Fl. Jam. ii.?).
Watling's; Grand Cayman.

Carica Papaya, L. Spec. 1753, Eleuthera, Port Antonio, cult.

CUCURBITACEÆ.

Momordica, L. Gen. 1737; Tourn. Inst. 1700.

M. CHARANTIA, L. Spec. 1753.
Lucea; Porus.
Var. ZEYLANICA, (Mill.). *Momordica Zeylanica*, Mill. Dict. 1768.

Kingston; Constant Springs; Port Morant; Grand Cayman.

Melothria, L. Coroll. 1737.

M. FLUMINENSIS, Gardn. in Hook. Lond. Journ. Bot. i. 1842.

Bog Walk.

M. GUADALUPENSIS, (Spreng.) Cogn. in DC. Mon. Phan. iii. 1881. *Bryonia*, Spreng. Syst. iii. 1826. *M. pervaga*, Griseb. Fl. B. W. I. 1864.

Port Morant; Lucea.

Anguria, L. Spec. Ed. 2, 1763.

A. PEDATA, Jacq. Pl. Carib. 1760.

Eleuthera.

BEGONIACEÆ.

Begonia, L. Gen. Ed. 2, 1742; Tourn. Inst. 1700.

B. ACUMINATA, Dryand. in Trans. Linn. Soc. i. 1791.

Blue Mt. Peak; Bog Walk.

B. NITIDA, Dryand. l. c.

Blue Mt. Peak.

CACTEÆ.

Melocactus, "Link, Enum. ii. 1822." (ex Link and Otto, Verh. Gartenb. iii. 1827.)

M. COMMUNIS, Link & Otto, l. c. *Cactus Melocactus*, L. Spec. 1753.

Port Royal.

Cereus, Haw. Syn. 1812.

C. GRANDIFLORUS, (L.) Haw. l. c. *Cactus*, L. Spec. 1753.

Port Antonio; Lucea.

C. SWARTZII, Griseb. Fl. B. W. I. 1864.

Cat Is.

Abundant from Governor's Harbor to Jamaica, especially at Port Royal.

Rhipsalis, Gærtn. Fr. i. 1788.

R. CASSYTHA, Gærtn. l. c.

Blue Mts.; Port Antonio.

Opuntia, Adans. Fam. 1763; Tourn. Inst. 1700.

O. COCHENILLIFER, (L.) Mill. Dict. 1768. *Cactus*, L. Spec. 1753.

Bog Walk; Lucea; Grand Cayman.

O. FICUS-INDICA, (L.) Mill. l. c. *Cactus*, L. l. c.

Jamaica.

O. SPINOSISSIMA, Mill. l. c.

Fortune Is.; Inagua.

Abundant also at Port Royal.

O. TUNA, (L.) Mill. l. c. *Cactus*, L. l. c.

Bahamas.

FICOIDEÆ.

Sesuvium, L. Syst. x. 1759.

S. PORTULACASTRUM, (L.) L. Syst. x. 1759. *Portulaca*, L. Spec. 1753.

Eleuthera; Cat Is.; Crooked Is.; Grand Cayman.

UMBELLIFERÆ.

Hydrocotyle, L. Gen. 1737; Tourn. Inst. 1700.

H. UMBELLATA, L. Spec. 1753.

Kingston.

Daucus, L. Gen. 1737; Tourn. Inst. 1700.

D. CAROTA, L. Spec. 1753.

Escaped above Abbey Green, Blue Mts.

ARALIACEÆ.

Sciodaphyllum, P. Br. Hist. Jam. 1756.

S. ARBOREUM, (L.). *Aralia arborea*, L. Syst. x. 1759. *S. Jacquini*, Griseb. Fl. B. W. I. 1864.

Port Antonio.

S. CAPITATUM, (Jacq.) Griseb. l. c. *Aralia*, Jacq. Pl. Carib. 1760.

Blue Mts.

S. HEPTAPHYLLUM, (L.). *Aralia Sciodaphyllum*, Sw. Prod. 1788. *S. Brownei*, Spreng. Syst. i. 1825. *Vitis heptaphylla*, L. Mant. ii. 1771.

Blue Mt. Peak.

CAPRIFOLIACEÆ.

Sambucus nigra, L. Spec. 1753, cultivated. Grand Cayman; Lucea.

RUBIACEÆ.

Lygistum, P. Br. Hist. Jam. 1756. *Manettia*, Mutis. in L. Mant. ii. 1771.

L. AXILLARE, Lam. Ill. i. 1791. *Petesia Lygistum*. L. Syst. x 1759. *Manettia Ligistum*, Sw. Prod. 1788.

Manettia Ligistum, Sw. Prod. 1788.

Blue Mt. Peak.

Exostema, (Pers.) Rich. in Humb. & Bonpl. Pl. Æquin. i. 1808. *Cinchona*, Sect., Pers. Syn. i. 1805.

E. CARIBÆUM, (Jacq.) Roem. & Sch. Syst. v. 1819. *Cinchona*, Jacq. Pl. Carib. 1760.

Crooked Is.; Lucea.

Portlandia, P. Br. Hist. Jam. 1756.

P. GRANDIFLORA, L. Syst. x. 1759.

Porus.

Rachicallis, DC. Prod. iv. 1830.

R. AMERICANA, (Jacq.). *Hedyotis Americana*, Jacq. Pl. Carib. 1760. *R. rupestris*, DC. Prod. iv. 1830.

Nassau; Crooked Is.; Grand Cayman.

Oldenlandia, L. Syst. Nat. Ed. 2, 1740; Plum. Gen. 1703.

O. CALLITRICHOIDES, Griseb. Cat. Pl. Wr. ii. 1862.

Grand Cayman.

Growing on the stone wall of a shallow well.

Hamelia, Jacq. Pl. Carib. 1760.

H. LUTEA, Rohr. in Smith in Rees, Cycl. xvii. 1819.

Port Antonio.

H. PATENS, Jacq. Pl. Carib. 1760.

Nassau.

Catesbæa, L. Gen. 1737.

C. PARVIFLORA, Sw. Prod. 1788.

Crooked Is.; Port Antonio; Lucea.

The Crooked Is. specimens agree with Curtiss No. B (= 1130*) but are spineless. The other specimens have long and slender spines.

Randia, Houst. in L. Hort. Cliff. 1737.

R. ACULEATA, L. Spec. 1753.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Inagua; Port Morant; Lucea; Porus.

The Inagua specimens are spineless and have small leaves about 7 mm. long.

Genipa, L. Syst. Nat. Ed. 2, 1740; Tourn. Inst. 1700.

G. CLUSIÆFOLIA, (Jacq.) Griseb. Fl. B. W. I. 1864. *Gardenia*, Jacq. Coll. v. 1796.

Nassau; Cat Is.; Watling's; Crooked Is.; Fortune Is.

Guettarda, L. Spec. 1753.

G. CALYPTRATA, Rich. Cuba, t. 46, 1845–55.

Inagua.

G. ELLIPTICA, Sw. Prod. 1788.

Nassau; Eleuthera; Fortune Is.; Inagua.

The Inagua specimens have the fruits solitary on pedicels about 1 cm. long.

G. SCABRA, (L.) Lam. Ill. ii. 1793. *Matthiola*, L. Spec. 1753.

Nassau; Inagua.

Laugeria, Vahl, Eclog. i. 1796.

Laugeria, Jacq. Pl. Carib. pp. 2 and 16, 1760, L. Spec. Ed. 2, 1762, is founded on *L. odorata*, Jacq. l. c. which is now the type of a section of *Guettarda* (Sect. *Matthiola*, Benth. & Hook., Sect. *Guettardaria*, DC.). *Laugeria*, Vahl, l. c. included *L. coriacea*, Vahl, and *L. resinosa*, Vahl, no generic characters being given. The former does not belong to *Laugeria* as limited by Benth. & Hook.

L. DENSIFLORA, (Wr.). *Stenostomum*, Wr. in Griseb. Cat. Pl. Cub. 1866. Wr. Pl. Cub. No. 2713.

Nassau.

Machaonia, Humb. & Bonpl. Pl. Æquin. i. 1808.

M. ROTUNDATA, Griseb. Fl. B. W. I. 1864.

Port Antonio.

This answers to the description with the exception that the leaves are ovate or elliptical and pointed. It is the same as a specimen without specific name, in Herb. Cambridge, collected in Jamaica by Purdie, 1844. Burchill's No. 8444 and 8472–2 from Brazil, differ only in having the leaves sparingly pubescent along the veins beneath and rather more

pubescent fruit. *M. acuminata* has a looser inflorescence and leaves more pubescent beneath (Gardner 3212, Prov. Goyaz, in Herb. Cambridge).

Erithalis, P. Br. Hist. Jam. 1756.

E. FRUTICOSA, L. Syst. x. 1759.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Fortune Is.; Watling's; Inagua; Port Antonio; Lucea; Grand Cayman.

Chiococca, P. Br. Hist. Jam. 1756.

C. ALBA, (L.). *Lonicera alba*, L. Spec. 1753. *C. racemosa*, L. Syst. x. 1759.

Nassau; Eleuthera; Cat Is.

C. PARVIFOLIA, Wullschl. in Griseb. Fl. B. W. I. 1864.

Nassau; Crooked Is.; Grand Cayman.

Phialanthus, Griseb. Fl. B. W. I. 1864.

P. MYRTILLOIDES, Griseb. l. c.; Hook. Ic. Pl. t. 1801.

Fortune Is.

Coffea Arabica, L. Spec. 1753. Cultivated. Blue Mts.

Strumpfia, Jacq. Pl. Carib. 1760.

S. MARITIMA, Jacq. l. c.

Nassau; Eleuthera; Watling's; Crooked Is.; Grand Cayman.

Morinda, L. Gen. 1737; Vaill. Act. Acad. Par. 1722.

M. ROYOC, L. Spec. 1753.

Kingston; Port Morant; Lucea; Grand Cayman.

Faramea, Aubl. Guian. i. 1775.

F. AMERICANA, (L.) OK. Rev. Gen. 1891. *Ixora Americana*, L. Syst. x. 1759. *F. odoratissima*, DC. Prod. iv. 1830.

Bog Walk.

Myrstiphyllum, P. Br. Hist. Jam. p. 152, 1756.

Psychotria, L. Syst. x. 1759 (with reference to Br. Jam. t. 17, fig. 2=*Psychotrophum*, P. Br. p. 160).

M. BRACHIATUM, (Sw.). *Psychotria brachiata*, Sw. Prod. 1788.

Port Antonio.

M. CORYMBOSUM, (Sw.). *Psychotria corymbosa*, Sw. Prod. 1788.
Blue Mt. Peak.

M. MARGINATUM, (Sw.). *Psychotria marginata*, Sw. l. c.
Port Antonio.

M. PUBESCENS, (Sw.). *Psychotria pubescens*, Sw. l. c.
Port Antonio.

M. UNDATUM, (Jacq.). *Psychotria undata*, Jacq. Hort. Schoen. iii. 1798.
Nassau; Eleuthera; Cat Is.; Grand Cayman.

Palicourea, Aubl. Guian. i. 1775.

P. ALPINA, (Sw.) DC. Prod. iv. 1830. *Psychotria*, Sw. Prod. 1788.
Blue Mt. Peak.

P. CROCEA, (Sw.) DC. l. c. *Psychotria*, Sw. l. c.
Port Morant.

P. PAVETTA, (Sw.) DC. l. c. *Psychotria*, Sw. l. c.
Port Antonio.

Ernodea, Sw. Prod. 1788.

E. LITTORALIS, Sw. Prod. 1788.
Nassau; Cat Is.; Crooked Is.; Fortune Is.; Watling's; Inagua; Grand Cayman.

Spermacoce, L. Gen. 1737; Dill. Hort. Elth. 1732.

S. ASPERA, Aubl. Guian. 1775.
Nassau; Eleuthera; Cat Is.; Inagua.

S. LÆVIS, Lam. Ill. i. 1791.
Nassau; Constant Springs; Bog Walk; Port Morant; Port Antonio (R.); Grand Cayman.

S. TENUIOR, L. Spec. 1753; Lam. Ill. i. 1791.
Eleuthera; Fortune Is.; Inagua; Lucea; Porus; Grand Cayman.

S. THYMOCEPHALA, (Griseb.). *Borrera*, Griseb. Cat. Pl. Cub. 1866.
Cat Is.; Crooked Is.; Fortune Is.

S. VERTICILLATA, L. Spec. 1753.
Blue Mt. Peak; Porus; Port Antonio.

Mitracarpus, Zucc. in Schult. Mant. iii. 1827.

M. VILLOSUS, (Sw.) Cham. & Schlecht. in Linnæa, 1828. *Spermacoce*, Sw. Obs. 1791.

Constant Springs; Porus.

Relbunium, Endl. Gen. 1838.

R. HYPOCARPIUM, (L.) Hemsl. B. C. A. ii. 1881. *Valantia hypocarpa*, L. Syst. x. 1759.

Blue Mt. Peak.

COMPOSITÆ.

Struchium, P. Br. Hist. Jam. 1756. *Sparganophorus*, Gærtn. Fr. ii. 1791; Vaill. Act. Ac. Par. 1719.

S. SPARGANOPHORUM, (L.) OK. Rev. Gen. 1891. *Ethulia*, L. Spec. Ed. 2, 1763. *Sparganophorus Vaillantii*, Gærtn. l. c.

Lucea.

Vernonia, Schreb. Gen. ii. 1791.

V. ACUMINATA, Less. in Linnæa, 1831.

Blue Mt. Peak.

V. ARBORESCENS, (L.) Sw. Fl. Ind. Occ. iii. 1806. *Conyza*, L. Syst. x. 1759.

Constant Springs; Blue Mts.; Porus; Grand Cayman.

Var. *divaricata*, (Sw.) Griseb. Fl. B. W. I. 1864. Constant Springs· Blue Mts. This seems scarcely a distinct variety.

V. BAHAMENSIS, Griseb. Fl. B. W. I. 1864.

Cat Is.; Inagua.

V. CINEREA, (L.) Less. in Linnæa. 1829. *Conyza*, L. Spec. 1753.

Kingston; Bog Walk; Port Morant; Porus.

Elephantopus, L. Gen. 1737; Vaill. Act. Acad. Par. 1719.

E. SCABER, L. Spec. 1753.

Blue Mts.; Bog Walk; Port Antonio; Porus.

E. SPICATUS, Juss. in Aubl. Pl. Guian. 1775.

Constant Springs; Bog Walk; Porus; Port Morant.

The Bog Walk specimens have narrow leaves and scabrous pubescence, the others have broader leaves and villous pubescence.

Ageratum, L. Gen. 1737.

A. CONYZOIDES, L. Spec. 1753.
Blue Mt. Peak; Inagua; Port Antonio. The awnless form (*A. muticum*, Griseb. Fl. B. W. I. 1864), Blue Mt. Peak; Nassau; Fortune Is.

Eupatorium, L. Gen. 1737; Tourn. Inst. 1700.

E. AGERATIFOLIUM, DC. Prod. v. 1836.
Nassau.

E. CONYZOIDES, Vahl, Symb. iii. 1794.
Constant Springs; Port Morant; Grand Cayman.

E. DALEA, L. Syst. x. 1759.
Blue Mt. Peak.

E. NERVOSUM, Sw. Prod. 1788.
Lucea.

E. ODORATUM, L. Syst. x. 1759.
Porus.

E. PANICULATUM, Schrad. Ind. Sem. Hort. Gött. 1832.
Bog Walk; Porus; Port Antonio.

E. PARVIFLORUM, Sw. Prod. 1788.
Port Antonio.

E. REPANDUM, Willd. Spec. iii. 1803.
Crooked Is.

E. TRISTE, DC. Prod. v. 1836.
Blue Mt. Peak.

E. VILLOSUM, Sw. Prod. 1788.
Nassau; Cat Is.; Lucea; Porus; Grand Cayman.

Mikania, Willd. Spec. iii. 1803.

M. ORINOCENSIS, HBK. Nov. Gen. iv. 1820.
Kingston; Constant Springs; Blue Mts.; Port Morant; Porus; Lucea.

Solidago, L. Gen. 1737.

S. DOMINGENSIS, Spreng. Syst. iii. 1826.
Cat Is.; Fortune Is.; Inagua.

This agrees with Wr. Cub. Pl. 1314 and also with the description in Spreng. Syst. and DC. Prod. except that the inflorescence is corymbiform

rather than racemose. It has the aspect of *Baccharis* but the flowers are perfect and small rays are present.

Aster lævis, L. Spec. 1753, cultivated Grand Cayman.

Erigeron, L. Gen. 1737.

E. CANADENSIS, L. Spec. 1753.
Nassau; Cat Is.

E. JAMAICENSIS, L. Syst. x. 1759.
Port Antonio; Porus.

E. RIVULARIS, Sw. Prod. 1788.
Bog Walk.

Baccharis, L. Gen. 1737.

B. DIOICA, Vahl, Symb. iii. 1794.
Nassau; Eleuthera; Inagua.

DeCandolle changes the name to *B. Vahlii* (Prod. v. 1836) because, since all the species are diœcious, the name is inapplicable.

B. SCOPARIA, (L.) Pers. Syn. ii. 1807. *Chrysocoma*, L. Syst. x. 1759.
Blue Mt. Peak.

Pluchea, Cass. Bull. Soc. Philom. 1817.

P. ODORATA, (L.) Cass. Dict. xliii. 1826. *Conyza*, L. Syst. x. 1759.
Inagua; Blue Mts.; Grand Cayman.

Gnaphalium, L. Gen. 1737.

G. ALBESCENS, Sw. Prod. 1788.
Blue Mt. Peak.

Clibadium, L. Mant. ii. 1771.

C. ALEXANDRI, Griseb. Fl. B. W. I. 1864.
Blue Mts.; Blue Mt. Peak.

Parthenium, L. Gen. 1737.

P. HYSTEROPHORUS, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Inagua.

Iva, L. Hort. Upsal. 1748.

I. CHEIRANTHIFOLIA, HBK. Nov. Gen. iv. 1820.
Nassau; Grand Cayman.

Ambrosia, L. Gen. 1737; Tourn. Inst. 1700.

A. ARTEMISIÆFOLIA, L. Spec. 1753.

Nassau; Blue Mt. Peak.

A. HISPIDA, Pursh, Fl. 1814.

Nassau; Eleuthera; Crooked Is.; Grand Cayman.

Extensively creeping over the sand along the beach.

Xanthium, L. Gen. 1737; Tourn. Inst. 1700.

X. STRUMARIUM, L. Spec. 1753 (not *X. Canadense*, Mill. which has larger and more hispid fruit.)

Nassau.

Eupatoriophalacron, Adans. Fam. 1763; Vaill. Act. Acad. Par. 1720. *Eclipta*, L. Mant. ii. 1771.

E. ALBUM, (L.). *Eclipta alba*, Hassk. Pl. Jav. Rar. 1848. *Verbesina alba*, L. Spec. 1753.

Port Morant.

Borrichia, Adans. Fam. ii. 1763.

B. ARBORESCENS, (L.) DC. Prod. v. 1836. *Buphthalmium*, L. Syst. x. 1759.

Cat Is.; Crooked Is.; Fortune Is. Glabrate form. Nassau; Grand Cayman. Canescent form.

Wedelia, Jacq. Pl. Carib. 1760.

W. BUPHTHALMOIDES, (DC.) Griseb. Fl. B. W. I. 1864.

Nassau; Eleuthera; Cat Is.

W. TRILOBATA, (L.). *Silphium trilobatum*, L. Syst. x. 1759. *W. carnosa*, Pers. Syn. ii. 1807.

Constant Springs; Bog Walk; Blue Mts. (R.); Port Morant; Port Antonio; Grand Cayman.

Eleutheranthera, Poit. Nouv. Dict. H. Nat. vii. 1803. *Ogiera*, Cass. Dict. xxxv. 1825.

E. RUDERALIS, (Sw.). *Melampodium ruderale*, Sw. Fl. Ind. Occ. iii. 1806. *Ogiera*, Griseb. Fl. B. W. I. 1864.

Eleuthera.

Helianthus annuus was observed at Port Antonio.

Amellus, P. Br. Hist. Jam. 1756 (not L. Syst. x. 1759). *Melanthera*, Rohr. in Danske Nat. Selsk. Skrivt. ii. 1792.

A. ASPERA, (Jacq.) O. Kuntze, Rev. Gen. Pl. 1891. *Calea*,

Jacq. Coll. ii. 1788. *Melanthera deltoidea*, Michx. Fl. 1803.

Nassau; Eleuthera; Fortune Is.

Verbesina, L. Gen. 1737.

V. ENCELIOIDES, (Cav.) Benth. & Hook. Gen. Pl. (by implication). *Ximenesia*, Cav. Ic. rar. ii. 1793.

Eleuthera.

V. GIGANTEA, Jacq. Ic. rar. i. 1781–86.

Bog Walk.

Spilanthes, Jacq. Pl. Carib. 1760.

S. ULIGINOSA, Sw. Prod. 1788.

Lucea; Port Morant.

S. URENS, Jacq. Pl. Carib. 1760.

Port Morant; Port Antonio; Lucea.

Salmea, DC. Cat. H. Monspel. 1813.

S. PETROBOIDES, Griseb. Fl. B. W. I. 1864.

Grand Cayman.

S. SCANDENS, (L.) DC. Cat. H. Monsp. 1813. *Bidens*, L. Spec. 1753. *S. grandiceps*, Cass. Dict. xliii. 1827.

Blue Mts.; Blue Mt. Peak; Porus.

Ucacou, Adans. Fam. 1763. *Synadrella*, Gærtn. Fr. ii. 1791.

Cassini (Dict. Nat. Sc. xxix., p. 489, 1823) thinks that *Ucacou* should be rejected as it contained four other diverse species. It is one of the unfortunate provisions of the new system that such uncouth names as the above must be restored.

U. NODIFLORUM, (L.). *Verbesina nodiflora*, L. Spec. 1753. *Synadrella*, Gærtn. Fr. ii. 1791.

Nassau; Kingston; Port Morant; Porus; Grand Cayman.

Cosmos, Cav. Ic. rar. i. 1791.

C. CAUDATUS, HBK. Nov. Gen. iv. 1820.

Constant Springs; Blue Mts.; Port Morant.

Bidens, L. Gen. 1737; Tourn. Inst. 1700.

B. BIPINNATA, L. Spec. 1753.

Nassau; Constant Springs; Grand Cayman.

B. LEUCANTHA, (L.) Willd. Spec. iii. 1801. *Coreopsis*, L. Spec. Ed. 2, 1763.

Nassau; Eleuthera; Bog Walk; Blue Mt. Peak; Porus.

B. PILOSA, L. Spec. 1753.

Nassau; Eleuthera; Cat Is.; Grand Cayman.

B. REPTANS, (L.). *Coreopsis reptans*, L. Syst. x. 1759. *B. Coreopsidis*, DC. Prod. v. 1836.

Blue Mt. Peak.

Chrysanthellum, Rich. in Pers. Syn. ii. 1807.

C. AMERICANUM, (L.). *Anthemis Americana*, L. Spec. 1753. *C. procumbens*, Rich. l. c.

Port Morant; Lucea.

Pectis, L. Syst. x. 1759.

P. CUBENSIS, (Rich.) Griseb. Cat. Pl. Cub. 1866. "*Lorentia*, Rich."

Grand Cayman.

P. LINIFOLIA, L. Syst. x. 1759.

Nassau.

P. PLUMIERI, Griseb. Fl. B. W. I. 1864.

Lucea.

P. PUNCTATA, Jacq. Pl. Carib. 1760.

Lucea.

P. TENELLA, DC. Prod. v. 1836.

Lucea.

Emilia, Cass. Bull. Soc. Philom. 1817.

E. SONCHIFOLIA, (L.) DC. Prod. vi. 1837. *Cacalia*, L. Spec. 1753.

Nassau; Constant Springs; Bog Walk; Blue Mt. Peak; Porus; Lucea.

Senecio, L. Gen. 1737; Tourn. Inst. 1700.

S. DISCOLOR, (Sw.) DC. Prod. vi. 1837. *Cineraria*, Sw. Prod. 1788.

Porus.

Gynoxys, Cass. Dict. xliii. 1827.

G. INCANA, (Sw.) Less. Syn. 1832. *Cineraria*, Sw. Fl. Ind. Occ. iii. 1806.

Port Antonio.

Anastraphia, Don in Trans. Linn. Soc. xvi. 1830.

A. PAUCIFLOSCULA, Wr. in Herb. (Plate 12.)

Fortune Is.; Inagua; Crooked Is.

A shrub 1½ to 2 m. high. Leaves ovate or obovate, 2 cm. or less long, 1 cm. or less wide, coriaceous, glabrous and dull shining above, densely woolly tomentose beneath, margin entire or spiny denticulate, petiole about 2 mm. long. Heads terminating short leafy branches, narrow, about 5 mm. wide at the middle and about 2 cm. long. Involucral bracts gradually acuminate, more or less recurved spreading, striate, brownish, outer successively shorter. Pappus tawny.

Mr. Hemsley very kindly referred me to the herbarium name of Wright's, and I have since had the opportunity of seeing in Herb. Cambridge, No. 248 of the S. Domingo Comm. of Inquiry, which bears the above name. It differs from my specimens only in having more spinescent leaves, and involucral bracts acuminate but obtuse.

Chaptalia, Vent. Hort. Cels. 1800.

C. NUTANS, (L.) Hemsley, Biol. C. A. ii. 1881 (Benth. & Hook. Gen. Pl. by implication?). *Tussilago*, L. Syst. x. 1759. *Leria*, DC. Ann. Mus. xix. 1812.

Nassau; Port Antonio; Porus.

Var. LEIOCARPA, (DC.). *Leria leiocarpa*, DC. Prod. vii. 2, 1838.

Lucea.

Trixis, P. Br. Hist. Jam. 1756.

T. FRUTESCENS, DC. Prod. vii. 2, 1838. *Inula Trixis*, L. Syst. x. 1759.

Blue Mts.

Lampsana, L. Gen. 1737; Tourn. Inst. 1700.

L. COMMUNIS, L. Spec. 1753.

Blue Mt. Peak.

Lactuca, L. Gen. 1737; Tourn. Inst. 1700.

L. INTYBACEA, Jacq. Ic. rar. i. 1781–86.

Inagua.

L. JAMAICENSIS, Griseb. Fl. B. W. I. 1864.

Blue Mt. Peak.

Sonchus, L. Gen. 1737; Tourn. Inst. 1700.

S. OLERACEUS, L. Spec. 1753.

Nassau; Eleuthera; Blue Mt. Peak.

GOODENOVIÆ.

Scævola, L. Mant. ii. 1771.

S. PLUMIERI, (L.) Vahl, Symb. ii. 1791. *Lobelia*, L. Spec. 1753. *Scævola Lobelia*, L. Syst. Veg. xiii. 1774.
Eleuthera; Crooked Is.

LOBELIACEÆ.

Isotoma, Lindl. Bot. Reg. xii. 1826.

I. LONGIFLORA, (L.) Presl, Prod. Lob. 1836. *Lobelia*, L. Spec. 1753.
Bog Walk; Blue Mts.

Lobelia, L. Gen. 1737.

L. ASSURGENS, L. Syst. x. 1759. *Tupa*, A. DC. in Prod. vii. 1, 1839.
Blue Mt. Peak.

L. CLIFFORTIANA, Willd. Spec. iii. 1800.
Port Antonio.

L. ENSIFOLIA, (A. DC.). *Tupa*, A. DC. Prod. vii. 1, 1839.
Port Antonio.

L. MARTAGON, (Griseb.). *Tupa*, Griseb. Fl. B. W. I. 1864.
Blue Mt. Peak.

ERICACEÆ.

Clethra, L. Gen. 1737.

C. OCCIDENTALIS, (L.) Steud. Nomen. 1841. "*Tinus occident.*" L. Syst. x. 1759. *C. tinifolia*, Sw. Fl. Ind. Occ. ii. 1800. *C. trifolia*, Sw. Prod. 1788 (probably a misprint for *tinifolia*).
Blue Mt. Peak.

PLUMBAGINACEÆ.

Plumbago, L. Gen. 1737; Tourn. Inst. 1700.

P. SCANDENS, L. Spec. Ed. 2, 1762.
Nassau; Kingston; Constant Springs.

P. Capensis, Thunb. Prod. Cap. i. (1794?) Lucea, cultivated.

MYRSINEÆ.

Myrsine, L. Gen. 1737.

M. LÆTA, (Sw.) A. DC. Trans. Linn. Soc. xvii. 1834. *Samara*, Sw. Prod. 1788.
Blue Mt. Peak.

Jacquinia, L. Amœn. Acad. v. 1759.

J. ARMILLARIS, Jacq. Pl. Carib. 1760.
Nassau; Eleuthera; Cat Is.; Crooked Is.

SAPOTACEÆ.

Chrysophyllum, L. Gen. 1737.

C. CAINITO, L. Spec. 1753.
Blue Mts. at Gordontown.

C. OLIVIFORME, Lam. Dict. i. 1783.
Port Antonio.

Achras Sapota, L. Spec. 1753. Cultivated, Nassau; Lucea.

Bumelia, Sw. Prod. 1788.

B. RETUSA, Sw. l. c.
Cat Is.
Pedicels 2 to 4 mm. long.

Dipholis, A. DC. Prod. viii. 1844.

D. SALICIFOLIA, (L.) A. DC. Prod. viii. 1844. *Achras*, L. Spec. Ed. 2, 1762.
Lucea.

Mimusops, L. Amœn. Acad. i. 1749.

M. SIEBERI, A. DC. Prod. viii. 1844.
Crooked Is.; Fortune Is.

EBENACEÆ.

Diospyros, L. Gen. 1737.

D. HALESIOIDES, Griseb. Cat. Pl. Cub. 1866.
Eleuthera; Fortune Is.

D. TETRASPERMA, Sw. Prod. 1788.
Lucea.

APOCYNACEÆ.

Vinca, L. Gen. 1737.

V. ROSEA, L. Syst. x. 1759.
Nassau.

Plumeria, L. Gen. 1737; Tourn. Inst. 1700.

P. EMARGINATA, Griseb. Cat. Pl. Cub. 1866.
Eleuthera.

P. OBTUSA, L. Spec. 1753.
Cat Is.; Fortune Is.; Inagua; Grand Cayman.

P. SERICIFOLIA, Wr. in Griseb. Cat. Pl. Cub. 1866.
Inagua.

P. rubra, L. Spec. 1753. Cult. Port Antonio.

Tabernæmontana, L. Gen. 1737; Plum. Gen. 1703.

T. CITRIFOLIA, L. Spec. 1753.
Lucea; Grand Cayman.

Echites, P. Br. Hist. Jam. 1756.

E. ANDREWSII, Chapm. Fl. 1860. *E. neriandra*, Griseb. Fl. B. W. I. 1864.
Nassau; Eleuthera; Cat Is.; Watling's; Port Royal.

E. BARBATA, Desv. in Hamilt. Prod. Pl. Ind. Occ. 1825.
Port Morant.

E. Brownei, J. Müll.
Constant Springs; Bog Walk; Lucea.

E. PALUDOSA, Vahl, Eclog. ii. 1798.
Port Morant; Port Antonio; Grand Cayman.

E. SAGRÆI, A. DC. Prod. viii. 1844.
Nassau.

E. SUBERECTA, Jacq. Pl. Carib. 1760.
Eleuthera; Watling's; Fortune Is.; Crooked Is.; Inagua.

E. UMBELLATA, Jacq. Pl. Carib. 1760.
Nassau; Eleuthera; Cat Is.; Fortune Is.; Crooked Is.; Inagua; Port Royal; Bog Walk.

E. sp.
Port Antonio.

Near *E. paludosa*. Stem stout, sparsely hirsute; leaves oblong to oblanceolate, abruptly pointed, leathery, shining above, pubescent on

veins beneath, narrowed to a very short petiole; calyx lobes oblong, about 8 mm. long; corolla campanulate above a cylindrical base, narrow part 3½ cm. long, total length of corolla 7½ cm.

ASCLEPIADACEÆ.

Calotropis, R. Br. Mem. Wern. Soc. i. 1809.

C. PROCERA, (Ait.) R. Br. in Ait. Hort. Kew. Ed. 2, ii. 1811. *Asclepias*, Ait. Hort. Kew. 1789.

Fortune Is.

Asclepias, L. Gen. 1737; Tourn. Inst. 1700.

A. CURASSAVICA, L. Spec. 1753.

Nassau; Constant Springs; Blue Mts. (R.); Port Antonio (R.); Porus; Grand Cayman.

A. NIVEA, L. Spec. 1753.

Bog Walk; Porus.

Metastelma, R. Br. in Mem. Wern. Soc. i. 1809.

M. SCHLECTENDAHLII, Decsn. in DC. Prod. viii. 1844.

Eleuthera; Fortune Is.; Inagua.

Vincetoxicum, Walt. Fl. Car. 1788; Rupp. Fl. Jen. 1718.

V. PALUSTRE, (Pursh) Gray, Syn. Fl. ii. 1, 1886. *Cercopegia*, Pursh, Fl. 1814. *Seuteria maritima*, Decsn. in DC. Prod. viii. 1844.

Fortune Is.; Inagua.

Sarcostemma, R. Br. in Mem. Wern. Soc. i. 1809.

S. CLAUSA, (Jacq.) Roem. & Sch. Syst. vi. 1820. *Cynanchum*, Jacq. Pl. Carib. 1760. *S. Brownei*, Mey. Esseq. 1818.

Blue Mts.

Grisebach thinks that *C. clausum*, Jacq. agrees better with *S. glaucum*, HBK. but my plant agrees well with description and plate in Jacq. Stirp. Amer. p. 84. t. 60, fig. 2.

LOGANIACEÆ.

Spigelia, L. Gen. 1837.

S. ANTHELMIA, L. Spec. 1753.

Eleuthera; Fortune Is.; Port Morant; Port Antonio (R.); Lucea.

Mitreola, L. Gen. 1737.

M. PETIOLATA, Torr. & Gray, Fl. ii. 1841. *Ophiorrhiza Mitreola*, L. Spec. 1753.

Lucea.

Polypremum, L. Act. Soc. Ups. 1741.

P. PROCUMBENS, L. Spec. 1753.

Inagua.

GENTIANACEÆ.

Leianthus, Griseb. Gent. 1839.

L. LONGIFOLIUS, (L.) Griseb. l. c. *Lisianthus*, L. Mant. i. 1767.

Bog Walk.

Var. SCABRIDUS, Griseb. l. c.

Blue Mt. Peak; Port Morant.

HYDROPHYLLACEÆ.

Nama, L. Amoen. Acad. i. 1749.

N. JAMAICENSIS, L. Syst. x. 1759.

Porus; Grand Cayman.

BORRAGINEÆ.

Cordia, L. Gen. 1737; Plum. Gen. 1703.

C. CALLOCOCCA, L. Spec. Ed. 2, 1762.

Lucea; Grand Cayman.

C. CYLINDROSTACHYA, (Ruiz & Pav.) Roem. & Sch. Syst. iv. 1819. *Varronia*, Ruiz & Pav. Fl. ii. 1799.

Port Morant.

C. GLOBOSA, (L.) HBK. Nov. Gen. iii. 1818. *Varronia*, L. Spec. Ed. 2, 1762.

Watling's; Constant Springs; Port Morant; Port Antonio; Lucea; Porus; Grand Cayman.

C. LINEATA, (L.) Desv. in Jour. Bot. i. 1808. *Varronia*, L. Syst. x. 1759. *C. ulmifolia*, "Juss. in cours. bot. cult. ed. iv. 2, p. 148" (ex. DC. Prod.); Spreng. Syst. i. 1825.

Constant Springs; Blue Mts.

C. SEBESTENA, L. Spec. 1753.

Nassau; Inagua; Grand Cayman.

C. sp.

Nassau; Eleuthera; Cat Is.; Watling's; Fortune Is.; Inagua.

Low shrub; branches scabrous with white papillæ; leaves elliptical, entire or the larger rarely few serrate, apex acute, narrowed at base into a short petiole, very scabrous both sides, margin revolute, 3 to 5 cm. long, ¾ to 2 cm. wide; flowers in globose heads, peduncle 1½ to 3 cm. long; calyx hispid, lobes deltoid, becoming acuminate; fruit exserted from the scarcely enlarged calyx for ½ its length. Differs from *C.Lima* in longer peduncled heads, white and more scabrous pubescence on branches and narrower leaves; from this and also *C. pedunculosa*, Wr. (ex descr.) in having the fruit exserted.

Bourreria, P. Br. Hist. Jam. 1756.

B. HAVANENSIS, (Willd.) Miers, Bot. Contr. ii. 1869. *Ehretia*, Willd. in Roem. & Sch. Syst. iv. 1819.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Fortune Is.; Grand Cayman.

Tournefortia, L. Gen. 1737.

T. BICOLOR, Sw. Prod. 1788.

Var. LÆVIGATA, (Lam.) Griseb. Fl. B. W. I. 1864. *T. loevigata*, Lam. Ill. i. 1791.

Port Morant.

T. CYMOSA, L. Spec. Ed. 2, 1762.

Bog Walk; Blue Mts. (R.)

T. FERRUGINEA, Lam. Ill. i. 1791.

Kingston.

T. GNAPHALODES, (Jacq.) R. Br. Prod. 1810 (by implication only). *Heliotropium*, Jacq. Pl. Carib. 1760.

Nassau; Eleuthera; Watling's; Inagua; Grand Cayman.

T. HIRSUTISSIMA, L. Spec. 1753.

Blue Mts.

T. POLIOCHROS, Spreng. Syst. i. 1825.

Fortune Is.

T. VOLUBILIS, L. Spec. 1753.

Nassau; Eleuthera; Inagua.

These are the small leaved forms (Wr. Pl. Cub. 3131).

Heliotropium, L. Gen. 1737; Tourn. Inst. 1700.

H. CURASSAVICUM, L. Spec. 1753.
Nassau; Cat Is.; Fortune Is.; Inagua.

H. INDICUM, L. Spec. 1753.
Port Morant; Lucea.

H. INUNDATUM, Sw. Prod. 1788.
Fortune Is.; Inagua.

H. MICROPHYLLUM, Sw. ex Griseb. Fl. and DC. Prod.
Inagua.

H. PARVIFLORUM, L. Mant. ii. 1771.
Nassau; Eleuthera; Cat Is.; Inagua; Kingston; Grand Cayman.

CONVOLVULACEÆ.

Ipomoea, L. Gen. 1737.

I. BONA-NOX, L. Spec. Ed. 2, 1762.
Bog Walk.

I. FASTIGIATA, Sweet, Hort. Brit. Ed. 2, 1830.
Bog Walk; Port Morant; Lucea; Porus; Grand Cayman.

I. JAMAICENSIS, (Spreng.) Don, Gen. Syst. iv. 1838. *Convolvulus*, Spreng. Syst. i. 1825.
Eleuthera; Grand Cayman.

I. MICRODACTYLA, Griseb. Cat. Pl. Cub. 1866.
Nassau; Eleuthera.

I. PENTAPHYLLA, (L.) Jacq. Coll. ii. 1788. *Convolvulus*, L. Spec. Ed. 2, 1762.
Kingston; Porus.

I. PES-CAPRÆ, (L.) Sweet, H. Sub. Lond. 1818. *Convolvulus*, L. Spec. 1753.
Nassau; Fortune Is.; Inagua.

I. PURPUREA, (L.) Lam. Ill. i. 1791. *Convolvulus*, L. Spec. Ed. 2, 1762.
Kingston; Constant Springs.

I. QUINQUEFOLIA, (L.) Griseb. Fl. B. W. I. 1866. *Convolvulus*, L. Syst. x. 1759.
Constant Springs; Bog Walk.

I. REPANDA, Jacq. Pl. Carib. 1760.
Eleuthera; Cat Is.; Fortune Is.

I. SIDÆFOLIA, (HBK.) Choisy, Conv. Or. 1834. *Convolvulus*, HBK. Nov. Gen. iii. 1818.
Constant Springs; Port Morant; Porus; Lucea.

I. SINUATA, Ort. Dec. vii. *I. dissecta*, Pursh. Fl. 1814 (non Willd. Spec. i. 1797).
Nassau; Eleuthera; Porus; Grand Cayman.

I. TRILOBA, L. Spec. 1753.
Nassau; Eleuthera; Fortune Is.; Inagua; Grand Cayman.

I. TUBA, (Schl.) Don, Gen. Syst. iv. 1838. *Convovulus*, Schlecht. Linnæa, vi. 1831.
Nassau; Grand Cayman.

I. UMBELLATA, (L.) Mey. Esseq. 1818. *Convolvulus*, L. Spec. 1753.
Bog Walk; Port Morant; Lucea.

Convolvulus, L. Gen. 1737; Tourn. Inst. 1700.

C. JAMAICENSIS, Jacq. Obs. iii. 1764–71.
Nassau; Eleuthera; Cat Is.; Crooked Is.
A narrow leaved and canescent form: Fortune Is.; Inagua.

Jacquemontia, Choisy in Mem. Soc. Genev. vi. 1833.

J. PENTANTHA, (Jacq.) Don, Gen. Syst. iv. 1838. *Convolvulus*, Jacq. Ic. Rar. ii. 1786–93. *C. violaceus*, Vahl, Symb. iii. 1794.
Lucea.

Evolvulus, L. Spec. Ed. 2, 1762.

E. ALSINOIDES, L. Spec. Ed. 2, 1762.
Eleuthera; Cat Is.; Fortune Is.; Inagua.

E. ARBUSCULUS, Poir. Dict. Suppl. iii. 1813.
Eleuthera; Fortune Is.; Inagua.

E. NUMMULARIUS, (L.) L. Spec. Ed. 2, 1762. *Convolvulus*, L. Spec. 1753.
Nassau; Eleuthera; Lucea.

Cuscuta, L. Gen. 1737.

C. AMERICANA, L. Spec. 1753.
Eleuthera; Kingston.

C. OBTUSIFLORA, HBK., var. GLANDULOSA, Engelm. in Trans. Acad. Sci. St. L. i. 1859.
Lucea.

SOLANACEÆ.

Solanum, L. Gen. 1737; Tourn. Inst. 1700.

S. ACULEATISSIMUM, Jacq. Coll. i. 1786.
Nassau; Lucea.

S. BAHAMENSE, L. Spec. 1753.
Nassau.
Var. LANCEOLATUM, Griseb. Fl. B. W. I. 1864.
Nassau; Eleuthera; Cat Is. (R.); Crooked Is.; Watling's; Port Royal

S. IGNEUM, L. Spec. 1753.
Watling's.

S. JAMAICENSE, Sw. Fl. Ind. Occ. i. 1797.
Lucea.

S. NIGRUM, L. var. NODIFLORUM, (Jacq.) Gray, Syn. Fl. ii. 1, 1886. *S. nodiflorum*, Jacq. Ic. Rar. ii. 1786.
Blue Mt. Peak; Porus.
Var. OLERACEUM, (Rich.). *S. oleraceum*, Rich. in Dunal, Prod. xiii, 1, 1852.
Nassau; Inagua; Bog Walk; Lucea; Grand Cayman.

S. SCABRUM, Vahl, Eclog. i. 1796.
Grand Cayman.

S. SEAFORTHIANUM, Andr. Bot. Rep. t. 504, 1808.
Porus; Lucea.

S. TORVUM, Sw. Prod. 1788.
Nassau; Blue Mts.; Constant Springs; Port Antonio; Lucea; Porus.

S. VERBASCIFOLIUM, L. Spec. 1753.
Nassau; Eleuthera (R).

Physalis, L. Gen. 1737.

P. ANGULATA, L. Spec. 1753.
Kingston; Port Morant; Lucea; Grand Cayman.

P. PUBESCENS, L. Spec. 1753.
Kingston; Blue Mt. Peak.

Capsicum, L. Gen. 1737; Tourn. Inst. 1700.

C. FRUTESCENS, L. Spec. 1753.
Inagua; Constant Springs; Lucea; Kingston.

Datura, L. Gen. 1737.

D. FASTUOSA, L. Syst. x. 1759.
Cat Is.

D. METEL, L. Spec. 1753.
Inagua.

D. SUAVEOLENS, Humb. & Bonpl. in Willd. Enum. 1809.
Blue Mts.

Cestrum, L. Gen. 1737.

C. NOCTURNUM, L. Spec. 1753.
Port Antonio.

C. PALLIDUM, Lam. Dict. i. 1783.
Nassau; Cat Is.; Constant Springs; Blue Mts.; Port Morant; Port Antonio.

Nicotiana Tabacum, L. Spec. 1753. Cult. Lucea.

Browallia, L. Gen. 1753.

B. DEMISSA, L. Syst. x. 1759.
Blue Mts.

Brunfelsia, L. Gen. 1737.

B. JAMAICENSIS, (Benth.) Griseb. Fl. B. W. I. 1864. *B. nitida*, var., Benth. in DC. Prod. x. 1846.
Blue Mt. Peak.

SCROPHULARINEÆ.

Calceolaria, L. Mant. ii. 1771; Feuillé, Obs. iii. 1825.

C. SCABIOSÆFOLIA, Sims, Bot. Mag. 1828.
Blue Mts. abundant in springy ground on the road not far above Abbey Green.

Antirrhinum, L. Gen. 1737; Tourn. Inst. 1700.

A. ANTIRRHINIFLORA, (Willd.). *Maurandia*, Willd. Enum. 1809. *A. maurandioides*, Gray, Proc. Am. Acad. vii. 1867.

Nassau. Probably escaped.

Maurandia, Ort. Dec. ii. 1797.

M. ERUBESCENS, (Don) Gray, Proc. Am. Acad. vii. 1868. *Lophospermum*, Don in Sweet,Br. Fl. Gard. 1830.

Blue Mts. abundant from 1000 to 3000 ft.

Russelia, Jacq. Pl. Carib. 1760.

R. JUNCEA, Zucc. in Flora, 1832.

Grand Cayman, naturalized.

Stemodia, L. Syst. x. 1759.

S. DURANTIFOLIA, (L.) Sw. Obs. 1791. *Capraria*, L. Syst. x. 1759.

Cat Is.; Kingston; Port Morant.

S. MARITIMA, L. Syst. x. 1759.

Nassau; Eleuthera; Grand Cayman.

Moniera, P. Br. Hist. Jam. 1756. *Herpestis*, Gærtn. Fr. iii. 1805.

M. BROWNEI, Pers. Syn. ii. 1807. *Gratiola Monnieria*, L. Syst. x. 1759. *Herpestis Monnieria*, HBK. Nov. Gen. ii. 1817.

Cat Is.; Kingston; Port Antonio.

Scoparia, L. Spec. 1753.

S. DULCIS, L. Spec. 1753.

Port Morant; Lucea; Porus.

Var. TENUIFOLIA, Griseb. Fl. B. W. I. 1864.

Kingston.

Capraria, L. Gen. 1737.

C. BIFLORA, L. Spec. 1753.

Nassau; Cat Is.; Lucea; Grand Cayman.

Var. PILOSA, Griseb. Fl. B. W. I. 1864.

Watling's; Fortune Is.; Inagua.

Scarcely more than a form.

Veronica, L. Gen. 1737; Tourn. Inst. 1700.

V. SERPYLLIFOLIA, L. Spec. 1753.
Blue Mt. Peak.

Buchnera, L. Gen. 1737.

B. ELONGATA, Sw. Prod. 1788.
Port Antonio.

GESNERACEÆ.

Achimenes, P. Br. Hist. Jam. 1756.

A. PULCHELLA, (L 'Her.). *Cyrilla*, L 'Her. Stirp. Nov. 1784. *A. coccinea*, Pers. Syn. ii. 1807.
Blue Mts.

Pentaraphia, Lindl. Bot. Reg. xiii. 1827.

P. CALYCOSA, (Hook.) Decsn. in Ann. Sci. Nat. 1846. *Conradia*, Hook. Ic. vii. 1844.
Blue Mt. Peak.

P. SLOANEI, (DC.). *Conradia*, DC. Prod. vii. 1839. *Gesneria acaulis*, L. Spec.?
Bog Walk.

Rytidophyllum, Mart. Nov. Gen. iii. 1829.

R. TOMENTOSUM, (L.) Mart. l. c. *Gesnera*, L. Spec. 1753.
Blue Mts.; Port Antonio.

Columnea, L. Syst. Nat. Ed. 2, 1740; Plum. Gen. 1703.

C. TINCTA, Griseb. Pl. Wr. ii. 1862.
Blue Mt. Peak.

Besleria, L. Gen. 1737; Plum. Gen. 1703.

B. LUTEA, L. Spec. 1753.
Blue Mt. Peak; Port Antonio.

BIGNONIACEÆ.

Catalpa, Scop. Introd. 1777.

C. LONGISSIMA, (Jacq.) Sims, Bot. Mag. 1808. *Bignonia*, Jacq. Pl. Carib. 1760.
Cat Is.; Constant Springs; Kingston (cult.).

Tabebuia, Gomez, Obs. ii. 1803.

T. LEUCOXYLON, (L.) DC. Prod. ix. 1845. *Bignonia*, L. Spec. 1753.

Eleuthera; Cat Is.

T. PENTAPHYLLA, (Juss.) Hemsl. Biol. C. A. ii. 1882. *Tecoma*, Juss. Gen. 1789. *Bignonia*, L. Spec.?

Lucea; Grand Cayman.

Tecoma, L. Gen. 1737.

T. STANS, (L.) Juss. Gen. 1789. *Bignonia*, L. Spec. Ed. 2, 1763.

Nassau; Inagua; Constant Springs.

Tecoma Capensis, (Thunb.) Lindl. Bot. Reg. 1828. *Bignonia*, Thunb. Prod. 1794–1800. Blue Mt. Peak, probably escaped.

Jacaranda, Juss. Gen. 1789.

J. CŒRULEA, (L.) Griseb. Fl. B. W. I. 1864. *Bignonia*, L. Spec. 1753.

Cat Is.

Crescentia, L. Gen. 1737.

C. CUJETE, L. Spec. 1753.

Kingston.

PEDALINEÆ.

Sesamum orientale, L. Spec. 1753. Eleuthera, cult. and escaped.

ACANTHACEÆ.

Thunbergia, Retz, Act. Lund, i. 1776.

T. ALATA, Bojer in Hook. Exot. Fl. iii. 1827.

Nassau; Constant Springs; Bog Walk; Porus.

T. FRAGRANS, Willd. Spec. iii. 1800.

Blue Mts.; Constant Springs; Port Morant.

Ruellia, L. Gen. 1737; Plum. Gen. 1703.

R. CLANDESTINA, L. Spec. p. 634, 1753. *R. tuberosa*, L. l. c. p. 635.

Kingston; Port Morant; Lucea; Grand Cayman.

Blechum, P. Br. Hist. Jam. 1756.

B. BLECHIOIDES, (Sw.). *Ruellia*, Sw. Prod. 1788. *B. laxiflorum*, Juss. Ann. Mus. ix. 1807

Port Morant.

B. BROWNEI, Juss. Ann. Mus. ix. 1807. *Ruellia Blechum*, L. Amoen. Acad. v. 1760.
Nassau; Port Morant; Lucea; Porus; Grand Cayman.

Andrographis, Nees in Wall. Pl. As. Rar. iii. 1832.

A. PANICULATA, (Burm.) Nees l. c. 1832. *Justicia*, Burm. Fl. Ind. 1768.
Kingston.

Beloperone, Nees in Wall. l. c.

B. NEMOROSA, (Sw.) Nees in DC. Prod. xi. 1847. *Justicia*, Sw. Prod. 1788.
Lucea.

Dianthera, Gronov. Fl. Virg. 1739.

D. COMATA, L. Syst. x. 1759.
Lucea.

D. SECUNDA, (Vahl) Griseb. Fl. B. W. I. 1864. *Justicia*, Vahl, Symb. ii. 1791.
Lucea.

MYOPORINEÆ.

Bontia, L. Gen. 1737; Plum. Gen. 1703.

B. DAPHNOIDES, L. Spec. 1753.
Grand Cayman.

VERBENACEÆ.

Lantana, L. Gen. 1737.

L. CAMARA, L. Spec. 1753.
Watling's; Bog Walk; Lucea; Porus; Grand Cayman.

L. CROCEA, Jacq. Hort. Schoen. iv. 1804.
Nassau; Eleuthera; Cat Is.; Lucea.

L. INVOLUCRATA, L. Amoen. Acad. iv. 1759.
Nassau; Eleuthera; Cat Is.; Watling's; Fortune Is.; Crooked Is.; Inagua.

L. LILACINA, Desf. Cat. Hort. Par. Ed. 3, 1829.
Blue Mt. Peak; Port Morant; Constant Springs.

L. STRICTA, Sw. Prod. 1788.
Kingston; Blue Mts.; Blue Mt. Peak; Grand Cayman.

L. TRIFOLIA, L. Spec. 1753.
Bog Walk; Port Morant.

Lippia, L. Gen. 1737.

L. NODIFLORA, (L.) Michx. Fl. 1803. *Verbena*, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Inagua; Port Morant; Porus; Grand Cayman.

Bouchea, Cham. in Linnæa, vii. 1832.

B. PRISMATICA, (L.) OK. Rev. Gen. 1891. *Verbena*, L. Spec. 1753. *B. Ehrenbergii*. Cham. l. c.
Kingston; Port Royal.

Abena, Neck. Elem. Bot. i. 1790. *Stachytarpheta*, Vahl, Enum. i. 1804.

A. CAYENNENSIS, (Vahl). *Stachytarpheta*, Vahl, Enum. i. 1804.
Blue Mts. (R).

A. JAMAICENSIS, (L.). *Verbena*, L. Spec. 1753. *Stachytarpheta*, Vahl, l. c.
Nassau; Eleuthera; Cat Is.; Fortune Is.; Inagua; Constant Springs; Port Morant; Porus; Grand Cayman.

Priva, Adans. Fam. 1763.

P. LAPPULACEA, (L.) Pers. Syn. ii. 1807. *Verbena*, L. Spec. 1753. *P. echinata*, Juss. Ann. Mus. vii. 1806.
Eleuthera; Inagua; Kingston; Porus; Grand Cayman.

Verbena, L. Gen. 1737; Tourn. Inst. 1700.

V. BONARIENSIS, L. Spec. 1753.
Blue Mts.

V. URTICIFOLIA, L. Spec. 1753.
Port Antonio.

Citharexylon, Juss. in Linn. Amoen. Acad. i. 1749.

C. VILLOSUM, Jacq. Ic. Rar. i. 1781–86.
Nassau; Cat Is.; Lucea.

Duranta, L. Gen. 1737.

D. REPENS, L. Spec. 1753. *D. Plumieri*, Jacq. Pl. Carib. 1760.

Nassau; Eleuthera; Blue Mt. Peak; Grand Cayman.

In the first edition of the Spec. Pl., Linnæus uses the phrases "Duranta spinosa" and "Duranta inermis" for the two species, but the marginal (specific) names are *repens* and *erecta*. These are, however, quite generally quoted as *D. spinosa* and *D. inermis*, and even by Linnæus himself (Spec. Ed. 2, p. 888).

Callicarpa, L. Act. Soc. Ups. 1741.

C. FULVA, Rich. (ex. Griseb. Cat. Pl. Cub.)
Cat Is.

Ægiphila, Jacq. Obs. ii. 1767.

Æ. ELATA, Sw. Prod. 1788.
Port Morant; Grand Cayman, downy form.

Petitia, Jacq. Pl. Carib. 1760.

P. DOMINGENSIS, Jacq. l. c.
Grand Cayman.

P. PŒPPIGII, Schau in DC. Prod. xi. 1847.
Eleuthera.

These two species seem not sufficiently distinct.

Ovieda, L. Gen. 1737, p. 59. *Clerodendron*, L. Gen. 1737, p. 186.

O. ACULEATA, (L.). *Volkameria*, L. Spec. 1753. *Clerodendron*, Griseb. Fl. B. W. I. 1864.
Grand Cayman.

Avicennia, L. Gen. 1737.

A. NITIDA, Jacq. Pl. Carib. 1760.
Fortune Is.; Port Morant.

LABIATÆ.

Ocymum, L. Gen. 1737; Tourn. Inst. 1700.

O. MICRANTHUM, Willd. Enum. 1809.
Lucea; Bog Walk.

Hyptis, Jacq. Coll. i. 1786.

H. CAPITATA, Jacq. Ic. Rar. i. 1781–86.
Bog Walk; Blue Mts.

H. PECTINATA, (L.) Poit. Ann. Mus. Par. vii. 1806. *Nepeta*, L. Syst. x. 1759.

Inagua; Constant Springs; Port Morant; Port Antonio; Bog Walk; Porus; Grand Cayman.

H. SUAVEOLENS, (L.) Poit. l. c. *Ballota*, L. l. c.
Eleuthera; Porus; Lucea.

H. VERTICILLATA, Jacq. Ic. Rar. i. 1781–86.
Constant Springs; Port Morant.

Salvia, L. Gen. 1737; Tourn. Inst. 1700.

S. COCCINEA, L. f. Suppl. p. 88, 1781.
Lucea.

Quoted sometimes as "L. Mant. p. 88."

S. OCCIDENTALIS, Sw. Prod. 1788.
Constant Springs; Blue Mts.; Kingston; Porus; Grand Cayman.

S. SEROTINA, L. Mant. i. 1767.
Eleuthera; Cat Is.; Watling's; Inagua; Grand Cayman.

S. TENELLA, Sw. Prod. 1788.
Eleuthera (R).

Scutellaria, L. Gen. 1737; Herm. Hort. Lugd. Bat. 1687.

S. PURPURASCENS, Sw. Prod. 1788.
Eleuthera.

Stachys, L. Gen. 1737; Tourn. Inst. 1700.

S. ARVENSIS, L. Spec. Ed. 2, 1763.
Blue Mt. Peak.

Anisomeles, R. Br. Prod. 1810.

A. INDICA, (L.) OK. Rev. Gen. 1891. *Nepeta*, L. Spec. 1753. *Ballota disticha*, L. Mant. ii. 1767.
Port Morant.

Leonurus, L. Gen. 1737.

L. SIBIRICUS, L. Spec. 1753.
Nassau; Porus; Blue Mts.

Leonotis, (Pers.) R. Br. Prod. 1810 (proposed by Persoon Syn. ii. 1807.)

L. NEPETÆFOLIA, (L.) R. Br. l. c. *Phlomis*, L. Spec. 1753.
Nassau; Eleuthera; Inagua; Porus; Kingston.

Persoon l. c. includes this in his proposed genus.

Teucrium, L. Gen. 1737; Tourn. Inst. 1700.

T. CUBENSE, L. Mant. i. 1767.
Cat Is.; Inagua.

T. INFLATUM, Sw. Prod. 1788.
Port Morant; Port Antonio.

PLANTAGINEÆ.

Plantago, L. Gen. 1737; Tourn. Inst. 1700.

P. MAJOR, L. Spec. 1753.
Blue Mt. Peak.

NYCTAGINEÆ.

Mirabilis, L. Gen. 1737; Rupp. Fl. Jen. 1718.

M. JALAPPA, L. Spec. 1753.
Nassau; Fortune Is.

Boerhaavia, L. Gen. 1737; Vaill. Sex. 1718.

B. CARIBÆA, Jacq. Obs. 1764–71. *B. hirsuta*, Willd. Phyt. 1794.
Kingston; Porus; Grand Cayman.

B. PANICULATA, Rich. Act. Soc. H. N. Par. i. 1792.
Nassau; Eleuthera; Porus.

B. SCANDENS, L. Spec. 1753.
Eleuthera; Kingston.

Bougainvillea spectabilis, Willd. Spec. ii. 1799 is cultivated.

Pisonia, L. Gen. 1737; Plum. Gen. 1703.

P. ACULEATA, L. Spec. 1753.
Lucea.

P. DISCOLOR, Spreng. Syst. ii. 1825.
Eleuthera; Cat Is.

P. OBTUSATA, Sw. Fl. Ind. Occ. iii. 1806.
Nassau; Crooked Is.

AMARANTACEÆ.

Celosia, L. Gen. 1737.

C. PANICULATA, L. Spec. 1753. *C. nitida*, Vahl, Symb. ii. 1791.
Kingston; Port Antonio (R).

Chamissoa, HBK. Nov. Gen. ii. 1817.

C. ALTISSIMA, (Jacq.) HBK. l. c. *Achyranthes*, Jacq. Pl. Carib. 1760.

Blue Mts.; Port Morant; Port Antonio; Porus.

Amaranthus, L. Gen. 1737; Tourn. Inst. 1700.

A. CRASSIPES, Schlect. in Linnæa, vi. 1831.

Kingston.

A. GRACILIS, Desf. Cat. H. Par. Ed. 1, 1804.

Eleuthera; Fortune Is.; Grand Cayman.

A. PANICULATUS, L. Spec. Ed. 2, 1763.

Fortune Is.

A. POLYGONOIDES, L. Pug. Jam. 1759.

Eleuthera; Inagua; Kingston.

A. SPINOSUS, L. Spec. 1753.

Nassau; Kingston.

A. TRISTIS, L. Spec. 1753.

Port Morant; Grand Cayman.

Cyathula, Lour. Fl. Coch. i. 1790.

C. PROSTRATA, (L.) Blume, Bijdr. 1825–26. *Amaranthus*, L. Spec. Ed. 2, 1762.

Lucea.

Achyranthes, L. Gen. 1737.

A. ASPERA, L., var. OBTUSIFOLIA, (Lam.) Griseb. Fl. B. W. I. 1864. *A. obtusifolia*, Lam. Dict. i. 1783.

Nassau; Kingston; Lucea; Porus (type); Grand Cayman.

Telanthera, R. Br. in Tuck. Congo. 1818.

T. POLYGONOIDES, (L.) Moq. in DC. Prod. xiii. 2, 1849. *Illecebrum*, L. Spec. Ed. 2, 1762.

Kingston; Port Morant.

Style nearly as long as ovary; sepals only villous below, scarcely pointed.

Alternanthera, Forsk. Fl. Aeg. & Arab. 1775.

A. REPENS, (L.) OK. Rev. Gen. 1891. *Achyranthes repens*, L. Spec. 1753. *Alternanthera Achyrantha*, R. Br. Prod. 1810.

Nassau; Kingston; Porus.

Style very short, sepals hispid, pungently pointed.

A. MUSCOIDES, (Sw.). *Lithophila*, Sw. Fl. Ind. Occ. i. 1797.

Inagua.

Philoxerus, R. Br. Prod. 1810.

P. VERMICULARIS, (L.) R. Br. Prod. 1810. *Gomphrena*, L. Spec. 1753.

Eleuthera; Port Royal; Port Antonio; Grand Cayman.

Iresine, P. Br. Hist. Jam. 1756.

I. CELOSIOIDES, L. Spec. Ed. 2, 1763.

Nassau; Eleuthera; Cat Is.; Watling's; Blue Mt. Peak; Porus; Lucea; Grand Cayman.

CHENOPODIACEÆ.

Chenopodium, L. Gen. 1737; Tourn. Inst. 1700.

C. AMBROSIOIDES, L. Spec. 1753.

Blue Mts.

C. MURALE, L. Spec. 1753.

Eleuthera.

Atriplex, L. Gen. 1737; Tourn. Inst. 1700.

A. CRISTATA, HBK. Nov. Gen. ii. 1817.

Nassau.

There is no positive evidence of a perennial root, and most of the specimens are apparently annual.

Salicornia, L. Hort. Cliff. 1737; Tourn. Inst. 1700.

S. AMBIGUA, Michx. Fl. 1803.

Crooked Is.

PHYTOLACCACEÆ.

Rivina, L. Gen. 1737; Plum. Gen. 1703.

R. HUMILIS (*α* canescens) L. Spec. 1753. *R. lævis*, L., var. *pubescens*, Griseb. Fl. B. W. I. 1864.

Cat Is.; Port Morant.

Var. GLABRA, L. Spec. 1753. *R. lævis*, Griseb. Fl. l. c.
Nassau; Kingston; Constant Springs; Port Morant; Porus; Grand Cayman.

R. OCTANDRA, L. Syst. x. 1759.
Lucea.

Petiveria, L. Gen. 1737; Plum. Gen. 1703.

P. ALLIACEA, L. Spec. 1753.
Kingston; Porus.

BATIDEÆ.

Batis, P. Br. Hist. Jam. 1756.

B. MARITIMA, L. Syst. x. 1759.
Inagua.

POLYGONACEÆ.

Polygonum, L. Gen. 1737; Tourn. Inst. 1700.

P. DENSIFLORUM, Meisn. in Mart. Fl. Bras. v. 1855.
Bog Walk; Grand Cayman.

Coccoloba, L. Syst. x. 1759.

C. LAURIFOLIA, Jacq. Hort. Schoen. iii. 1798.
Nassau; Eleuthera; Fortune Is.; Crooked Is.; Inagua.

C. UVIFERA, (L.) Jacq. Pl. Carib. 1760. *Polygonum*, L. Spec. 1753.
Nassau; Cat Is.; Crooked Is.; Watling's; Inagua; Grand Cayman.

ARISTOLOCHIACEÆ.

Aristolochia, L. Gen. 1737; Tourn. Inst. 1700.

A. GRANDIFLORA, Sw. Prod. 1788.
Bog Walk; Port Morant.

PIPERACEÆ.

Piper, L. Gen. 1737.

P. ADUNCUM, L. Spec. 1753.
Port Morant; Porus.

P. AMALGO, L. Spec. 1753.

Blue Mts.; Constant Springs; Port Antonio; Porus; Grand Cayman.

P. HISPIDUM, Sw. Prod. 1788. *Artanthe scabra*, Miq. Syst. 1843–44.

Bog Walk; Port Morant; Port Antonio.

P. hirsutum, Sw. Prod. p. 15, is cited by C. DC. Prod. xvi. 1. This name does not appear in the former work, but in his Fl. Ind. Occ. i. 1797, where reference is made to *P. hispidum*, Prod. Thus *P. hispidum*, HBK. Nov. Gen. i. 1815 is untenable.

P. MACROPHYLLUM, Sw. Prod. 1788.

Var. JAMAICENSE, (Griseb.). *Artanthe Jamaicensis*, Griseb. Fl. B. W. I. 1864.

Bog Walk.

P. macrophyllum, HBK. Nov. Gen. i. 1815, is untenable, but not having made a study of the continental forms of this genus, I have refrained from giving a new name.

P. PELTATUM, L. Spec. 1753.

Port Morant.

P. UMBELLATUM, L. Spec. 1753.

Port Morant; Porus.

Peperomia, Ruiz & Pav. Prod. 1794.

P. AMPLEXICAULIS, (Sw.) Dietr. Spec. i. 1831. *Piper*, Sw. Prod. 1788.

Port Antonio.

P. GLABELLA, (Sw.) Dietr. Spec. i. 1831. *Piper*, Sw. Prod. 1788.

Bog Walk; Porus; Grand Cayman (R).

P. MAGNOLIÆFOLIA, (Jacq.) Dietr. Spec. i. 1831. *Piper*, Jacq. Coll. iii. 1789. *Peperomia obtusifolia*, Dietr. Spec. i. 1831.

Blue Mt. Peak.

LAURINEÆ.

Persea, Gærtn. Fr. iii. 1805; Plum. Gen. 1703.

P. GRATISSIMA, Gærtn. Fr. l. c. *Laurus Persea*, L. Spec.

1753. *Persea Persea*, Cockerell in Torr. Bull. xix. p. 95, 1892.

Port Morant, common in cultivation.

Nectandra, "Roland in Rottb." Descr. Rar. Pl. Sur. 1776.

N. ANTILLANA, Meisn. in DC. Prod. xv. 1, 1864.

Blue Mt. Peak; Port Morant; Port Antonio.

N. SANGUINEA, Rottb. "in Act. Hafn. 1778."

Nassau.

Cassytha, L. Spec. 1753.

C. FILIFORMIS, L. Spec. 1753.

Nassau; Eleuthera; Cat Is.; Grand Cayman.

LORANTHACEÆ.

Arceuthobium, Bieb. Fl. Taur. Cauc. iii. 1819. *Razoumowskia*, Hoffm. Hort. Mosq. 1808?

A. CUPRESSOIDES, (Macf.) Griseb. Fl. B. W. I. 1864. "*Viscum*, Macf." ex Griseb. l. c.

Blue Mt. Peak.

A. OPUNTIOIDES, (L.) Griseb. Fl. B. W. I. 1864. *Viscum*, L. Spec. 1753.

Blue Mt. Peak.

Phoradendron, Nutt. in. Jour. Acad. Phil. ser. 2, i. 1847.

P. BERTERIANUM, (DC.) Griseb. Fl. B. W. I. 1864. *Viscum*, DC. Prod. iv. 1830.

Blue Mts.

P. RUBRUM, (L.) Griseb. Fl. B. W. I. 1864. *Viscum*, L. Spec. 1753.

Constant Springs.

P. TETRASTICHUS, Griseb. Pl. Wr. i. 1860.

Crooked Is.

EUPHORBIACEÆ.

Euphorbia, L. Gen. 1737.

E. ANTIQUORUM, L. Spec. 1753.

Inagua.

Introduced and well established in most of the Bahamas, forming impenetrable thickets 10 to 15 feet high.

E. Blodgettii, Engelm. in herb. *E. inæquilatera*, Chapm. Fl. (not Sonder). (Plate 13.)

Nassau; Eleuthera; Cat Is. (R.); Crooked Is.; Fortune Is.; Inagua; Lucea; Grand Cayman.

Prostrate spreading or erect, glabrous; leaves rather leathery, oval, more or less oblique, subcordate or cuneate at base, apex obtuse, rather remotely low-serrulate or denticulate towards the apex; upper leaves narrower, acutish and entire; stipules deltoid, upper side laciniate toothed, lower, 2-toothed; involucre hairy within, bearing four oval glands each with a white or pinkish appendage, two of which are roundish, entire and about the size of the gland, and two larger and retuse; lobes of involucre lanceolate, erose, nearly twice as long as gland and appendage; fruit glabrous, ovate; styles 3, short, each 2-parted to the middle; seeds oblong, square in cross section, reddish, microscopically papillate, becoming smooth and gray or brown after wetting, .7 by 1 mm. An average leaf is about 6 mm. by 12 mm. on a petiole 1 mm. long. Common in sandy soil along the coast.

This also occurs at Key West, Blodgett (type specimen, in Herb. Torrey. & Herb. Engelm.), S. Florida, Chapman, Curtiss, as shown by specimens in Herb. Engelmann.

E. buxifolia, Lam. Dict. ii. 1786.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Fortune Is.; Watling's; Inagua; Lucea; Grand Cayman.

E. heterophylla, L. Spec. 1753.

Nassau; Eleuthera; Cat Is.; Grand Cayman.

Var. cyathophora, (Murr.) Boiss. in DC. Prod. xv. 2, 1862. *E. cyathophora*, Murr. Comm. Gött. vii, 1777.

Constant Springs.

Var. graminifolia, (Michx.) Engelm. Mex. Bound. 1859. *E. graminifolia*, Michx. Fl. 1803.

Nassau; Eleuthera; Cat Is.; Fortune Is.; Inagua; Port Morant.

E. hypericifolia, L. Spec. 1753.

Nassau; Eleuthera; Inagua; Constant Springs; Bog Walk; Port Morant; Port Antonio; Lucea; Grand Cayman.

This differs from our common northern form in having the upper internodes conspicuously slender. No dark spots were observed on the leaves. Growth erect or ascending.

E. Peplus, L. Spec. 1753.

Blue Mt. Peak.

E. PILULIFERA, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Inagua; Kingston; Lucea.
Var. OBLITERATA, (Jacq.). *E. obliterata*, Jacq. Pl. Carib. 1760 (description insufficient). Sw. Prod. 1788; Fl. Ind. Occ. ii. 1800. *E. procumbens*, DC. Cat. H. Monsp. 1813. *E. pilulifera*, var. *procumbens*, Boiss. in DC. Prod. xvii. 1862. Parry & Palmer, C. Mex. Fl. No. 815.
Grand Cayman.

E. pulcherrima, (Grah.) Boiss. in DC. Prod. xv. 2, 1862. *Poinsettia*, Grah. in Edinb. Phil. Jour. 1836. Lucea, cultivated.

E. PUNICEA, Sw. Prod. 1788.
Fortune Is.; Inagua.

Phyllanthus, L. Gen. 1737.

P. ANGUSTIFOLIUS, (Sw.) Sw. Fl. Ind. Occ. ii. 1800. *Xylophylla*, Sw. Prod. 1788.
Lucea; Grand Cayman.

P. EPIPHYLLANTHUS, L. Spec. 1753. *P. falcatus*, Sw. Fl. Ind. Occ. ii. 1800.
Nassau; Eleuthera; Cat Is.; Watling's; Fortune Is.; Inagua.

P. LATIFOLIUS, (L.) Sw. Fl. Ind. Occ. ii. 1800. *Xylophylla*, L. Mant. ii. 1771.
Port Antonio.

P. LINEARIS, (Sw.) Sw. Fl. Ind. Occ. ii. 1800. *Xylophylla angustifolia*, var., Sw. Prod. 1788.
Lucea; Grand Cayman.

P. NIRURI, L. Spec. 1753.
Fortune Is.; Inagua; Kingston; Porus; Grand Cayman.

Jatropha, L. Gen. 1737.

J. CURCAS, L. Spec. 1753.
Grand Cayman.

J. GOSSYPIFOLIA, L. Spec. 1753.
Nassau; Kingston.

J. MULTIFIDA, L. Spec. 1753.
Lucea.

Aleurites, Forst. Char. Gen. 1776.

A. MOLUCCANA, (L.) Willd. Spec. iv. 1805. *Jatropha*, L. Spec. 1753. *A. triloba*, Forst. l. c.
Porus; Grand Cayman.

Croton, L. Gen. 1737.

C. CASCARILLA, (L.) L. Spec. Ed. 2, 1763. *Clutia*, L. Spec. 1753.
Watling's; Port Morant; Grand Cayman.
Var. LINEARIS, (Jacq.) Griseb. Fl. B. W. I. 1864. *Croton*, Jacq. Pl. Carib. 1760.
Nassau; Eleuthera; Cat. Is.

C. ELEUTERIA, (L.) Sw. Prod. 1788. *Clutia*, L. Spec. 1753.
Eleuthera; Grand Cayman.

C. HJALMARSONII, Griseb. Fl. B. W. I. 1864.
Fortune Is.; Inagua.

C. HUMILIS, L. Syst. x. 1759.
Kingston; Cat Is. (form approaching var. *angustifolius.*).

C. LOBATUS, L. Spec. 1753.
Label lost, but probably from Grand Cayman.

C. LUCIDUS, L. Syst. x. 1759.
Var. PUBIGERUS, Griseb. Fl. B. W. I. 1864.
Lucea; Grand Cayman.

Argythamnia, P. Br. Hist. Jam. 1756.

A. CANDICANS, Sw. Prod. 1788.
Cat Is.; Watling's (R.); Inagua; Lucea.

Manihot, Adans. Fam. 1763.

M. AIPI, Pohl, Pl. Bras. i. 1827. *Jatropha Manihot*, L. Spec. 1753. *Janipha*, HBK. Nov. Gen. ii. 1817. *Manihot Manihot*, Cockerell in Torr. Bull. xix. 1892.
Eleuthera; Lucea; Grand Cayman,— cultivated and escaped.

Bernardia, Houst. in P. Br. Hist. Jam. 1756.

B. CARPINIFOLIA, Griseb. Fl. B. W. I. 1864. *Adelia Bernardia*, L. Syst. 1759. *B. dichotoma*, Müll. Arg. in Linnæa, xxxiv. 1866.
Grand Cayman.

B. MEXICANA, (Hook. & Arn.) Müll. Arg. in Linnæa, xxxiv. 1866. *Hermesia ? Mexicana*, Hook. & Arn. Bot. Beech. 1841.
Eleuthera; Cat Is.

Acalypha, L. Hort. Cliff. 1737.

A. ALOPECUROIDES, Jacq. Ic. Rar. iii. 1786–93.
Nassau; Eleuthera; Grand Cayman.

Ricinus, L. Gen. 1737; Tourn. Inst. 1700.

R. COMMUNIS, L. Spec. 1753.
Fortune Is. Escaped.

Tragia, L. Gen. 1737; Plum. Gen. 1703.

T. VOLUBILIS, L. Spec. 1753.
Port Morant.

Hippomane, L. Gen. 1737.

H. MANCINELLA, L. Spec. 1753.
Inagua; Grand Cayman.

Gymnanthes, Sw. Prod. 1788.

G. LUCIDA, Sw. Prod. 1788.
Eleuthera.

Hura, L. Gen. 1737.

H. CREPITANS, L. Spec. 1753.
Nassau (Cult.); Port Antonio.

URTICACEÆ.

Trema, Lour. Fl. Cochinch. ii. 1790.

T. LIMA, (Lam.). *Celtis Lima*, Lam. Dict. iv. 1797 (non. Sw.) *C. Lamarckiana*, Roem. & Sch. Syst. vi. 1820. *Sponia Lamarckiana*, Decsn. Ann. Sc. Nat. 3, x. 1848.
Eleuthera; Nassau.

Ficus, L. Gen. 1737; Tourn. Inst. 1700.

F. CRASSINERVA, Desf. Hort. Par. 1829.
Port Antonio.

F. DIMIDIATA, Griseb. Fl. B. W. I. 1864.
Eleuthera; Grand Cayman.

F. LÆVIGATA, Vahl, Enum. ii. 1806.
Fortune Is.; Grand Cayman.

F. PERTUSA, L. f. Suppl. 1781.
Cat Is.

F. TRIGONATA, L. f. Suppl. 1781.
Port Antonio.

Artocarpus incisa, (Thunb.) L. f. Suppl. 1781. *Radermachia*, Thunb. Act. Holm. 1776. Bog Walk. *A. integrifolia*, (Thunb.) L. f. l. c. *Radermachia*, Thunb. l. c. Lucea. Cultivated and apparently escaped in places.

Coilotapalus, P. Br. Hist. Jam. 1756. *Cecropia*, "Löfl. It. Hisp. 1758."

C. PELTATA, (L.). *Cecropia peltata*, L. Syst. x. 1759.
Port Morant.

Fleurya, Gaud. in Freyc. Voy. Bot. 1826.

F. ÆSTIVANS, (L.) Gaud. l. c. *Urtica*, L. Spec. Ed. 2, 1763.
Nassau; Porus; Port Antonio.

Pilea, Lindl. Coll. 1821.

P. CILIARIS, (L.) Wedd. in Ann. Sci. Nat. 1852. *Urtica*, L. Syst. x. 1759.
Blue Mt. Peak.

P. DELTOIDEA, Liebm. K. Dansk. Vid. Sel. Skr. S. 5, ii. 1851. *P. microphylla*, var. *perexigua*, Wr. in Griseb. Pl. Wr. 1860. Wr. Pl. Cub. No. 1458.
Grand Cayman.

P. DIFFUSA, (Sw.) Wedd. l. c. 1852. *Urtica*, Sw. Act. Holm. 1785.
Blue Mt. Peak.

P. MICROPHYLLA, (L.) Liebm. l. c. *Parietaria*, L. Syst. x. 1759.
Nassau; Blue Mt. Peak; Port Antonio; Lucea.

P. PARIETARIA, (L.) Bl. Mus. Lugd. Bat. ii. 1853. *Urtica*, L. Spec. 1753.
Blue Mt. Peak; Blue Mts. (R.).

P. REPENS, (Sw.) Wedd. l. c. 1852. *Urtica*, Sw. Act. Holm. 1787.
Port Antonio.

Boehmeria, Jacq. Pl. Carib. 1760.

B. CAUDATA, Sw. Prod. 1788.
Blue Mt. Peak.

B. CYLINDRICA, (L.) Sw. Prod. 1788. *Urtica*, L. Spec. 1753.
Port Antonio.

B. RAMIFLORA, Jacq. Pl. Carib. 1760.
Port Antonio.

Phenax, Wedd. Ann. Sci. Nat. 1854.

P. HIRTUS, (Sw.) Wedd. in DC. Prod. xvi. 1869. *Boehmeria*, Sw. Prod. 1788.
Blue Mt. Peak.

Rousselia, Gaud. in Freyc. Voy. Bot. 1826.

R. LAPPULACEA, (Sw.) Gaud. l. c. 1826. *Urtica*, Sw. Prod. 1788.
Nassau.

CASUARINEÆ.

Casuarina, Rumph. Amb. iii. 1743.

C. EQUISETIFOLIA, Forst. Gen. Pl. Austr. 1776.
Nassau and Inagua (cult.); Crooked Is. (naturalized.)

HYDROCHARIDEÆ.

Thalassia, Soland. in Koen. & Sims. Ann. Bot. ii. 1806.

T. TESTUDINUM, Koen. l. c. 1806.
Fortune Is.; Inagua. Common throughout the West Indies.

ORCHIDEÆ.

Pleurothallis, R. Br. in Ait. f. Hort. Kew. v. 1813.

P. RACEMIFLORA, (Sw.) Lindl. in Hook Exot. Fl. 1825.

Epidendrum, Sw. Prod. 1788.
Blue Mt. Peak.

Microstylis, (Nutt.) Eat. Man. Ed. 3, 1822; Nutt. Gen. 1818 (proposed genus). *Achroanthes*, Raf. in Med. Repos. 1808.

It does not seem best to restore *Achroanthes* because of its insufficient description (conf. Introduction.)

M. UMBELLIFLORA, (Sw.). *Malaxis umbelliflora*, Sw. Prod. 1788. *Microstylis umbellulata*, Lindl. Gen. & Sp. Orch. 1830.
Blue Mt. Peak.

Bletia, Ruiz & Pav. Prod. 1794.

B. ALTA, (L.). *Limodorum altum*, L. Syst. xii. 1767. *B. verecunda*, R. Br. in Ait. f. Hort. Kew. 1813.
Lucea.

B. SHEPHERDII, Hook. in Bot. Mag. 1834.
Port Antonio; Bog Walk.

Epidendrum, L. Gen. 1737.

E. ALTISSIMUM, Bateman in Bot. Reg. 1838.
Cat Is.; Eleuthera.

Fruit about 2 cm. long.

E. ANCEPS, Jacq. Stirp. Amer. 1763. *E. fuscatum*, Sw. in Nov. Act. Ups. vi. 1799.
Port Antonio.

E. COCHLEATUM, L. Spec. Ed. 2, 1763.
Bahamas.

E. DIFFORME, Jacq. Stirp. Amer. 1763.
Port Antonio.

E. DIFFUSUM, Sw. Prod. 1788.
Port Antonio.

E. FRAGRANS, Sw. Prod. 1788.
Port Antonio; Blue Mt. Peak.

E. RIGIDUM, Jacq. Stirp. Amer. 1763.
Port Antonio.

E. STROBILIFERUM, G. Reichenb.
Port Antonio; Lucea.

E. VIRENS, Lindl. in Paxt. Fl. Gard. i. 1850.
Cat Is.; Inagua.

Fruit 3 to 4 cm. long.

Broughtonia, R. Br. in Ait. f. Hort. Kew. v. 1813.

B. SANGUINEA, (Sw.) R. Br. l. c. *Epidendrum*, Sw. Prod. 1788.
Port Morant.

Brassavola, R. Br. l. c. 1813.

B. CORDATA, Lindl. Bot. Reg. 1836.
Port Antonio; Port Morant.

Bot. Reg. No. 1914 but plate 1913 in the Garden copy.

Schomburgkia, Lindl. Sert. Orch. 1838.

S. THOMPSONIANA, Reichb. f.
Grand Cayman (determined at Kew).

Polystachya, Hook. Exot. Fl. 1825.

P. LUTEOLA, Hook. l. c.
Lucea.

A sterile specimen of a spider orchid collected at Grand Cayman may be *Æranthes filiformis*, Griseb.

Ornithidium, Salisb. Trans. Hort. Soc. i. 1812.

O. VESTITUM, (Sw.) Reichenb. *Epidendrum*, Sw. Prod. 1788.
Port Antonio.

Ponthievia, R. Br. in Ait. f. Hort. Kew. v. 1813.

P. GLANDULOSA, (Sims) R. Br. l. c. *Neottia*, Sims, Bot. Mag. 1805.
Bog Walk; Port Antonio.

Habenaria, Willd. Spec. iv. 1805.

H. MACULOSA, Lindl.
Blue Mt. Peak.

SCITAMINEÆ.

Costus, L. Gen. 1737.

C. GLABRATUS, Sw. Prod. 1788.
Port Antonio.

Renealmia, L. f. Suppl. 1781.

R. OCCIDENTALIS, (Sw.) Griseb. Pl. Carib. 1857. *Alpinia*, Sw. Prod. 1788.

Port Antonio.

Var. PARO-SECORA, (Jacq.) Griseb. Fl. B. W. I. 1864.

Port Antonio.

Canna, L. Gen. 1737.

C. INDICA, L. Spec. 1753.

Blue Mts.; Port Antonio; Port Morant.

BROMELIACEÆ.

Bromelia, L. Gen. 1737.

B. PINGUIN, L. Spec. 1753.

Kingston. Common throughout the islands, frequently cultivated for hedge.

Ananas, Adans. Fam. 1763; Tourn. Inst. 1700. *Ananassa*, Lindl. Bot. Reg. 1827.

A. sativus, (L.) R. & S. Syst. vii. 2, 1830. *Bromelia Ananas*, L. Spec. 1753. *Ananassa sativa*, Lindl. Bot. Reg. 1827. Cultivated in the Bahamas, especially Eleuthera.

Æchmea, R. & P. Prod. 1794.

Æ. sp.

Bog Walk.

Leaves .6 to 1 m. long, 9 cm. broad, rounded to a pointed apex, minutely lepidote beneath, minutely and rather distantly prickly on margin, peduncle stout, spikes sessile, oblong, 4 cm. long; bracts triangular-lanceolate, acuminate, shorter than spikes; bractlets orbicular, not striate, smooth, mucronate.

Æ. sp.

Lucea; Port Morant.

Leaf 12 cm. wide, rounded to a cusp, marginal teeth small, about 5 mm. apart; peduncle stout, spikes on pedicels about 5 to 10 mm. long; bracts about 15 cm. long, gradually narrowed to a sharp point, lax, much longer than spikes (specimen from Lucea); pedicels about 25 mm. long, bracts about 5 cm. long, shorter than spikes (specimens from Port Morant); spikes about 5 cm. long, oblong; bractlets ovate, rather abruptly narrowed to a long cusp 3 to 5 mm. long.

Pitcairnia, L'Her. Sert. Angl. vii. 1788.

P. BROMELIÆFOLIA, L'Her. l. c.
Bog Walk.

Guzmania, Ruiz & Pav. Fl. Per. iii. 1802.

G. TRICOLOR, Ruiz & Pav. l. c.
Port Antonio.

Tillandsia, L. Gen. 1737.

T. BALBISIANA, Schult. f. Syst. vii. 2, 1830.
Nassau; Lucea.

T. BULBOSA, Hook. Exot. Fl. iii. 1827.
Cat Is.; Inagua.

T. COMPLANATA, Benth. Bot. Sulph. 1844?
Blue Mt. Peak. (Specimen fragmentary).

T. FASCICULATA, Sw. Prod. 1788.
Fortune Is.; Inagua; Port Morant.

This is Curtiss No. 2844 (*T. bracteata*).

T. FLEXUOSA, Sw. Prod. 1788.
Inagua.

T. RECURVATA, L. Spec. Ed. 2, 1763.
Cat Is.; Constant Springs.

T. SETACEA, Sw. Prod. 1788.
Grand Cayman.

A small form similar to Curtiss 2848 but leaves shorter; may be *T. cæspitosa*, Le Conte, considered by Baker (Bromel.) to be a dwarf form of *T. setacea*.

T. UTRICULATA, L. Spec. 1753.
Cat Is.; Inagua; Port Antonio; Lucea.

Catopsis, Griseb. in Nachr. Ges. Gött. 1844.

C. VITELLINA, (L. K. & O.) Baker in Journ. Bot. 1887.
Tillandsia, Link, Klotzch & Otto, Ic. i. 1841.
Bahamas.

This is the same as Wr. Pl. Cub. 675 in Hb. Cambridge, and cited in Wr. & Sauv. Fl. Cub. as *C. nitida*. The peduncle is twice as long as leaves.

Another fragmentary specimen is probably C. NUTANS, Baker. Capules and bracts each about 4 cm. long.

IRIDEÆ.

Gladiolus, L. Gen. 1737; Tourn. Inst. 1700.

G. GANDAVENSIS.

Escaped around Abbey Green, Blue Mts.

AMARYLLIDIÆ.

Hypoxis, L. Syst. x. 1759.

H. DECUMBENS, L. Syst. x. 1759.

Port Antonio.

Hemsl. Biol. gives synonym, *Anthericum sessile*, Miller Fig. Pl. t. 39, fig. 2. This, however, is a polynomial, *A. sesile foliis linearibus planis*, etc. The title page and Pritzel give the date as 1760, but the dates of the plates vary. The above is 1755, Sept. 30th. It is quoted by Linn. Syst. x.

Crinum, L. Gen. 1737.

C. ERUBESCENS, Ait. Hort. Kew. 1789.

Port Morant.

Bulb brought from Jamaica flowered at the Garden, Aug. 3d, 1891. The segments were pure white, slightly tinged with purple near the apex instead of claret purple on the back as described by Baker (Amaryll.).

Hymenocallis, Salisb. in Trans. Hort. Soc. i. 1812.

H. sp.

Cat Is.; Eleuthera.

Near *H. lacerum*, Salisb. (*H. rotatum*, Ker). Flowers 7 or 8 in a sessile umbel; tube 7 or 8 cm. long; perianth divisions not quite as long, narrowly linear. Leaves distichous, 7 or 8, linear, 2 cm. broad, 30 to 40 cm. long, rounded at apex. Bulbs 3 to 6 cm. in diameter.

Sandy or rocky soil near the sea, often within the range of the tides.

Agave, L. Syst. vi. 1748.

A. SOBOLIFERA, Salm-Dyck Hort. 1834. *A. Antillarum*, Desc. Fl. Ant. iv. 1827. Engelm. notes on Agave, 313 (25). Gard. Chron. ii. 1877, p. 780, fig. 150.

Eleuthera.

Common also on Cat Is., called by the natives, "Bamboo," referring to the flower stalk which rises to the height of 25 ft.

DIOSCOREACEÆ.

Dioscorea, L. Gen. 1737; Plum. Gen. 1703.

D. ALATA, L. Spec. 1753.

Port Morant; Eleuthera. Escaped. Common in cultivation.

D. MULTIFLORA, Presl, Bot. Bemerk. 1844.
Port Antonio.

Rajania, L. Gen. 1737.

R. HASTATA, L. Spec. 1753.
Nassau; Cat Is.

LILIACEÆ.

Smilax, L. Gen. 1737; Tourn. Inst. 1700.

S. DOMINGENSIS, Willd. Spec. iv. 1805.
Cat Is.; Crooked Is.; Nassau; Port Morant.

S. HAVANENSIS, Jacq. Pl. Carib. 1760.
Var. VULGARIS, A. DC. Mon. Smil. 1878.
Nassau; subvar. *ovata*, Grand Cayman.

PONTEDERIACEÆ.

Heteranthera, Ruiz & Pav. Prod. 1794.

H. RENIFORMIS, Ruiz & Pav. Fl. Per. i. 1798.
Port Antonio; Port Morant.

COMMELINACEÆ.

Commelina, L. Gen. 1737; Plum. Gen. 1703.

C. NUDIFLORA, L. Spec. 1753.
Nassau; Bog Walk; Kingston; Porus; Grand Cayman.

C. VIRGINICA, L. Spec. Ed. 2, 1762.
Port Morant.

Tradescantia, L. Gen. 1737; Rupp. Fl. Jen. 1718.

T. MULTIFLORA, Sw. Prod. 1788.
Blue Mt. Peak.

Rhoeo, Hance in Walp. Ann. iii. 1853.

R. DISCOLOR, (L'Her.) Hance l. c. *Tradescantia*, L'Her. Sert. Angl. 1788.
Nassau; Port Antonio; Porus.

PALMÆ.

Sabal, Adans. Fam. 1763.

S. UMBRACULIFERA, (Jacq.) Mart. Hist. Palm. iii. 1836–50.

Corypha, Jacq. Fragm. 1809.

Cat Is.

Tree about 25 ft. high; inflorescence 4 ft. long; berries globose, black or greenish, 12 mm. in diameter. Albumen plain, concave at base, and embryo lateral.

Thrinax, Sw. Prod. 1788.

T. ARGENTEA, (Jacq.) Lodd. in Roem. & Sch. Syst. vii. 2, 1830. *Palma argentea*, Jacq. Fragm. 1809.

Eleuthera; Cat Is.; Grand Cayman. Common in the Bahamas.

T. PARVIFLORA, Sw. Prod. 1788.

Watling's.

Trunk small and smooth, 4 or 5 ft. high.

Acrocomia sclerocarpa, Mart. Hist. Palm. ii. 1823, Lucea, cultivated; *Elæis Guineensis*, L. Mant. i. 1767, Lucea, cultivated; *Cocos nucifera*, L. Spec. 1753, Cat Is., Port Antonio, Port Morant, cultivated throughout the tropics near the sea.

TYPHACEÆ.

Typha, L. Gen. 1737; Tourn. Inst. 1700.

T. DOMINGENSIS, Pers. Syn. ii. 1807. *T. angustifolia*, var. *Domingensis*. Griseb. Fl. B. W. I. 1864.

Port Morant; Grand Cayman.

In Persoon's Synopsis this species is preceded by an asterisk and placed between 1, *latifolia* and 2, *media*. In the preface he makes the following statement, "Varietates præcipuæ et subspecies non omissæ sunt. Speciebus obscuris, aut quoad sedem dubiis, vel accuratiori indagationi subjiciendis, signa crucis seu asteriscum apposui." I assume from this that *Domingensis* was used as a specific name. Kronfeld (Mon. Typh.) interprets it as a subspecies. In the latter case our plant becomes, *T. Domingensis* (Pers.) Kunth, Enum. iii. 1841. It is frequently quoted *T. angustifolia*, L. var. *Domingensis*, Pers.

AROIDEÆ.

Philodendron, Schott, Melet. i. 1832.

P. HEDERACEUM, (Jacq.) Schott, l. c. *Arum*, Jacq. Pl. Carib. 1760.

Port Antonio.

P. LACERUM, (Jacq.) Schott, l. c. *Arum*, Jacq. Schoenbr. iv. 1804.

Port Antonio; Port Morant.

P. TRIPARTITUM, (Jacq.) Schott, l. c. *Arum*, Jacq. Schœnbr. ii. 1797.
Lucea.

Syngonium, Schott in Wien. Zeitsch. iii. 1829.

S. AURITUM, (L.) Schott, Melet. i. 1832. *Arum*, L. Syst. x. 1759.
Bog Walk; Port Antonio; Lucea.

Dieffenbachia, Schott, Melet. i. 1832.

D. SEGUINE, (Jacq.) Schott, l. c. *Arum*, Jacq. Pl. Carib. 1760.
Port Antonio; Lucea.

ALISMACEÆ.

Sagittaria, L. Gen. 1737.

S. LANCIFOLIA, L. Syst. x. 1759.
Grand Cayman.

CYPERACEÆ.

Cyperus, L. Gen. 1737; Tourn. Inst. 1700.

C. ARISTATUS, Rottb. Descr. & Ic. 1773.
Inagua; Cat Is.

C. HUMILIS, Kunth. Wr. Pl. Cub. No. 700 (fide Britton).
Lucea.

C. ARTICULATUS, L. Spec. 1753.
Lucea.

C. BRUNNEUS, Sw. Fl. Ind. Occ. i. 1797.
Nassau; Eleuthera; Grand Cayman.

A form with small, sessile clusters was collected at Inagua; Cat Is.; Fortune Is.

C. ELEGANS, L. Spec. 1753. *C. laxus*, Lam. Ill. i. 1791.
Port Antonio.

C. FILIFORMIS, Sw. Prod. 1788.
Nassau; Crooked Is.; Grand Cayman.

C. FLAVOMARISCUS, Griseb. Fl. Br. W. I. 1864.
Port Morant; Blue Mt. Peak.

C. LIGULARIS, L. Amœn. Acad. v. 1760.
Nassau; Inagua; Kingston; Grand Cayman. Sandy soil near the coast.

C. MUTISII, (HBK.) Griseb. Fl. B. W. I. 1864. *Mariscus*, HBK. Nov. Gen. i. 1815. (fide Britton).
Blue Mt. Peak; Porus.

C. MUCRONATUS, Rottb. Descr. & Ic. 1773.
Kingston.

C. OCHRACEUS, Vahl, Enum. ii. 1806.
Port Morant; Lucea.

C. ODORATUS, L. Spec. 1753.
Port Morant; Bog Walk.

C. OLFERSIANUS, Kunth, Enum. ii. 1837.
Port Morant.

C. ROTUNDUS, L. Spec. 1753.
Nassau; Kingston.

C. VISCOSUS, Sw. Prod. 1788.
Eleuthera; Inagua; Grand Cayman.

Kyllinga, Rottb. Descr. & Ic. 1773.

K. MONOCEPHALA, Rottb. Descr. & Ic. 1773.
Blue Mt. Peak; Grand Cayman.

Eleocharis, R. Br. Prod. 1810.

E. CAPITATA, (Willd.) R. Br. Prod. 1810. *Scirpus*, Willd. Spec. i. 1797.
Cat Is.; Port Morant; Lucea.

E. CELLULOSA, Torr. Ann. Lyc. N. Y. iii. 1836.
Inagua.

E. CONSTRICTA, Schult. Mant. ii. 1824.
Port Morant; Port Antonio; Lucea.

E. INTERSTICTA, (Vahl) R. Br. Prod. 1810. *Scirpus*, Vahl, Enum. ii. 1806.
Port Morant; Port Antonio.

E. MUTATA, (L.) R. Br. Prod. 1810. *Scirpus*, L. Syst. x. 1759.
Port Antonio; Grand Cayman.

Dichromena, Michx. Fl. 1803.

D. CILIATA, Vahl, Enum. ii. 1806.

Port Antonio; Bog Walk; Lucea.

Some of the specimens are proliferous at the summit.

D. PUSILLA, (Sw.) Kunth, Enum. ii. 1837. *Schoenus*, Sw. Prod. 1788.

Port Antonio.

D. COLORATA, (L.). *Schoenus coloratus*, L. Spec. 1753. *Schoenus stellatus*, Lam. Dict. i. 1783. *Rhynchospora*, Griseb. Fl. B. W. I. 1864. *D. leucocephala*, Michx. Fl. 1803. *D. cephalotes*, (Walt.) Britt. Torr. Bull. 1888.

Nassau; Crooked Is.; Fortune Is. (R.); Inagua.

Iria, (Rich.) Hedw. Gen. 1806. *Cyperus*, Sect., Rich. in Pers. Syn. i, 1805. *Fimbristylis*, Vahl, Enum. ii. 1806.

I. FERRUGINEA, (L.) OK. Rev. Gen. 1891. *Scirpus*, L. Spec. 1753.

Nassau; Inagua; Port Morant; Kingston; Grand Cayman.

I. POLYMORPHA, (Rottb.) OK. Rev. Gen. 1891. *Schoenus*, Rottb. Desc. & Ic. 1773. *Fimbristylis*, Vahl, l. c.

Port Morant.

I. OBTUSIFOLIA, (Lam.). *Fimbristylis*, Kunth, Enum. ii. 1837. *Scirpus*, Lam. Ill. i. 1791.

Port Morant.

I. SPADICEA, (L.) OK. Rev. Gen. 1891. *Fimbristylis*, Vahl, Enum. ii. 1806. *Scirpus*, L. Spec. 1753.

Nassau; Cat Is.; Crooked Is.; Fortune Is.; Inagua; Port Antonio.

Rynchospora, Vahl, Enum. ii. 1806.

R. CORYMBOSA, (L.). *Scirpus corymbosus*, L. Syst. x. 1759. *R. florida*, Dietr. Spec. ii. 1833. *R. aurea*, Vahl, Enum. ii. 1806.

Blue Mt. Peak; Port Antonio.

R. CYPEROIDES, (Sw.) Mart. in Münch. Denkschr. vi. 1820. *Schoenus*, Sw. Prod. 1788.

Inagua.

R. POLYPHYLLA, Vahl, Enum. ii. 1806.
Blue Mt. Peak.

Cladium, P. Br. Hist. Jam. 1756.

C. MARISCUS, (L.) R. Br. Prod. 1810. *Schœnus*, L. Spec. 1753. *C. occidentale*, Schrad. Gram. i. 1806.
Nassau; Crooked Is.

Scleria, Berg in Vet. Acad. Handl. xxvi. 1765.

S. COMMUNIS, Kunth, Enum. ii. 1837. *S. pratensis*, Lindl. in Nees Cyp. Bras. 1842.
Port Morant.

S. FILIFORMIS, Sw. Prod. 1788.
Nassau; Eleuthera; Bog Walk.

S. MICROCARPA, Nees in Kunth, Enum. ii. 1837.
Port Antonio; Port Morant.

Kunth cites Nees Linnæa ix. 302, but this will not hold as there is no description.

Uncinia, Pers. Syn. ii. 1807.

U. JAMAICENSIS, Pers. Syn. ii. 1807.
Blue Mt. Peak.

GRAMINEAE.

Paspalum, L. Syst. x. 1759.

P. CÆSPITOSUM, Flügge, Mon. Gram. 1810.
Nassau; Cat Is.; Inagua; Port Antonio; Grand Cayman; Bog Walk.

P. CONJUGATUM, Berg, Act. Helv. vii. (about 1775).
Port Antonio; Bog Walk.

P. DISTICHUM, L. Amœn. Acad. v. 1760.
Fortune Is.

P. FILIFORME, Sw. Prod. 1788.
Lucea.

Paspalum filiforme, (L.) Flügge, Mon. Gram. 1810, should receive another name.

P. FIMBRIATUM, HBK. Nov. Gen. i. 1815.
Nassau; Bog Walk; Port Antonio (R); Porus; Grand Cayman.

P. GLABRUM, Poir. Dict. v. 1804.
Eleuthera; Cat Is.; Watling's; Crooked Is.; Fortune Is.; Inagua.

P. NANUM, Wr. in Griseb. Cat. Pl. Cub. 1866.
Inagua.

P. PANICULATUM, L. Spec. Ed. 2, 1762.
Blue Mt. Peak.

P. PLICATULUM, Michx. Fl. 1803.
Port Antonio.

P. VIRGATUM, L., var. STRAMINEUM, Griseb. Fl. B. W. I. 1864.
Port Morant; Bog Walk.

Panicum, L. Gen. 1737; Tourn. Inst. 1700.

P. ACUMINATUM, Sw. Prod. 1788.
Blue Mt. Peak.

P. BREVIFOLIUM, L. Spec. 1753.
Bog Walk; Port Antonio.

P. DICHOTOMUM, L., var. GLABRESCENS, Griseb. Fl. B. W. I. 1864.
Fortune Is.

P. DISTANTIFLORUM, "Rich." (Gris. Cat. Pl. Cub.).
Inagua.

P. DISTICHUM, Lam. Dict. iv. 1797.
Port Antonio.

P. DIVARICATUM, L. Syst. x. 1759.
Nassau; Eleuthera; Cat Is.; Crooked Is.; Porus; Bog Walk.

P. FASCICULATUM, Sw. Prod. 1788.
Lucea; Port Morant; Porus.

P. FUSCUM, Sw. Prod. 1788.
Port Antonio; Kingston.

P. GLUTINOSUM, Sw. Prod. 1788.
Blue Mt. Peak.

P. HORIZONTALE, (Willd.) Meyer, Esseq. 1818. *Digitaria*, Willd. Enum. 1809. *D. setigera*, Roth.
Eleuthera; Port Antonio; Bog Walk; Grand Cayman.

P. INSULARE, (L.) Meyer, Esseq. 1818. *Andropogon*, L. Amœn. Acad. v. 1760. *Tricholæna*, Griseb. Fl. B. W. I. 1864.

Eleuthera; Cat Is.; Kingston; Bog Walk; Grand Cayman.

P. LANATUM, Sw. Prod. 1788.

Port Morant; Port Antonio; Blue Mts.; Porus; Lucea.

P. LINKIANUM, Kunth, Gram. i. 1829. *Digitaria marginata*, Link, Hort. Berol. i. 1821.

Nassau; Eleuthera; Fortune Is.; Inagua; Kingston; Blue Mt. Peak; Bog Walk; Porus.

P. MARTINICENSE, Griseb. Fl. B. W. I. 1864.

Port Morant; Bog Walk.

P. MAXIMUM, Jacq. Ic. Rar. i. 1781.

Nassau; Fortune Is.; Kingston; Constant Springs; Port Antonio; Blue Mts. (R); Porus.

P. MOLLE, Sw. Fl. Ind. Occ. i. 1797.

Nassau; Bog Walk; Lucea.

P. MYURUM, (Beauv.) Meyer, Esseq. 1818. *Hymenachne*, Beauv. Agrost. 1812.

Port Morant.

P. PALLENS, Sw. Prod. 1788.

Port Morant; Port Antonio (R); Bog Walk.

P. PALMIFOLIUM, Poir. Dict. xii. 1816.

Blue Mts.

P. PASPALOIDES, Pers. Syn. i. 1805.

Fortune Is.; Inagua; Port Antonio.

I have not used *P. brizoides*, Lam. Ill. i. 1791, as the description says lower glume subacute, while in my specimens it is truncate.

P. TRICHANTHUM, Nees, Cyp. Bras. 1842.

Port Antonio.

Oplismenus, Beauv. Fl. Owar. ii. 1807.

O. COLONUS, (L.) HBK. Nov. Gen. i. 1815. *Panicum*, L. Spec. Ed. 2, 1762.

Bog Walk.

O. HIRTELLUS, (L.) Rœm. & Sch. ii. 1817. *Panicum*, L. Amœn. v. 1760.

Bog Walk.

Setaria, Beauv. Fl. Owar. ii. 1807.

Setaria, Acharius, Lichenographiæ Suecicæ Prodromus, 1798, p. 219. This is called a tribe but his tribes correspond to genera. It is however used as a genus in Michx. Fl. ii. p. 331, 1803. *Setaria* does not appear in Acharius, Lichenographia Universalis, 1810, but on p. 592 we find the new genus *Alectoria* which includes *Lichen jubatus*, L. as does *Setaria*, Ach. I will leave it with lichenologists to decide whether *Setaria*, Ach. should be restored.

S. CAUDATA, (Lam.) Roem. & Sch. Syst. ii. 1817. *Panicum*, Lam. Ill. i. 1791.

Eleuthera.

S. GLAUCA, (L.) Beauv. Agrost. 1812. *Panicum*, L. Spec. 1753.

Nassau; Eleuthera; Inagua; Port Morant; Lucea; Grand Cayman.

S. SETOSA, (Sw.) Beauv. Agrost. 1812. *Panicum*, Sw. Prod. 1788.

Kingston.

Cenchrus, L. Coroll. 1737.

C. ECHINATUS, L. Spec. 1753.

Eleuthera; Inagua; Grand Cayman.

Var. VIRIDIS, (Spreng.) Griseb. Fl. B. W. I. 1864. *C. viridis*, Spreng. Syst. i. 1825.

Nassau; Eleuthera; Fortune Is.; Kingston; Grand Cayman.

C. TRIBULOIDES, L. Spec. 1753.

Nassau; Crooked Is.; Fortune Is.; Inagua.

Stenotaphrum, Trin. Agrost. 1820.

S. AMERICANUM, "Schk. Hort. Monac. t. 98."

Nassau; Port Antonio; Grand Cayman.

The date of Hort. Monac. is given as 1819, but that is before the genus was established. This species probably has earlier names.

Olyra, L. Syst. x. 1759.

O. LATIFOLIA, L. Syst. x. 1759.

Bog Walk; Port Morant.

O. PAUCIFLORA, Sw. Prod. 1788.
Port Antonio.

Coix, L. Gen. 1737.

C. LACHRYMA-JOBI, L. Spec. 1753.
Port Antonio; Lucea.

Swampy places, seemingly indigenous.

Tripsacum, L. Syst. x. 1759.

T. MONOSTACHYUM, Willd. Spec. iv. 1805.
Lucea.

Oryza, L. Gen. 1737; Tourn. Inst. 1700.

O. SATIVA, L. Spec. 1753.
Lucea, escaped.

Homalocenchrus, "Meig. Hall. Stirp. Helv. ii. 201, 1768."
(Britton, N. Y. Acad. Trans. 1889.)

In Pollich Palat. 1776, there is one species given under this genus, "H. oryzoides cl. Meig. Act. Helvet, 14, p. 317. Hall. Hist. II. p. 202."

H. MONANDRA, (Sw.) OK. Rev. Gen. 1891. *Leersia monandra*, Sw. Prod. 1788.
Bog Walk.

Arundinella, Raddi, Agrost. Bras. 1823.

A. MARTINICENSIS, Trin. Diss. ii. 1826.
Lucea.

Anthephora, Schreb. Gram. 1799.

A. ELEGANS, Schreb. l. c.
Kingston; Porus; Lucea.

Imperata, Cyrill. Pl. Neap. ii. 1792.

I. CONTRACTA, (HBK.). *Saccharum contractum*, HBK. Nov. Gen. i. 1815.
Jamaica.

Manisurus, L. Mant. ii. 1771.

M. GRANULARIS, (L.) Sw. Prod. 1788. *Cenchrus*, L. Mant. ii. p. 575 (appx.) 1771.
Port Antonio.

Andropogon, L. Spec. 1753.

A. BICORNIS, L. Spec. 1753.
Port Antonio.

A. GLOMERATUS, (Walt.) B. S. P. Cat. 1888. *Andropogon macrourus*, Michx. Fl. 1803. *Cinna glomerata*, Walt. Fl. 1788.

Nassau; Eleuthera; Crooked Is.; Inagua; Port Morant; Bog Walk; Blue Mt. Peak; Grand Cayman.

Sorghum, Moench. Meth. 1794.

S. HALAPENSE, (L.) Pers. Syn. i. 1805. *Holcus*, L. Spec. 1753.

Grand Cayman.

Aristida, L. Gen. 1737.

A. SCABRA, Kunth, Rev. Gram. i. 1829. *Streptachne Floridana*, Chapm. Fl. 1860. Wr. Pl. Cub. 3835, "A. scabra" in Hb. Cambr.

Nassau; Eleuthera; Cat Is.; Crooked Is.

A. STRICTA, Michx. Fl. 1803.

Fortune Is.

Sporobolus, R. Br. Prod. 1810.

S. DOMINGENSIS, (Trin.) Kunth, Enum. ii. 1823. *Vilfa*, Trin. in Spreng. N. Entd. ii. 1821.

Eleuthera; Fortune Is.; Inagua.

S. INDICUS, (L.) R. Br. Prod. 1810. *Agrostis*, L. Spec. 1753.

Eleuthera; Porus; Bog Walk. Common along sea-shore in Bahamas.

S. JACQUEMONTII, Kunth, Revis. Gram. 1829.

Nassau; Kingston; Lucea.

S. VIRGINICUS, (L.) Kunth, Revis. Gram. 1829. *Agrostis*, L. Spec. 1753.

Nassau; Crooked Is.; Inagua; Port Antonio; Grand Cayman. Common along sea shore.

Capriola, Adans. Fam. 1763. *Cynodon*, Rich. in Pers. Syn. i. 1805.

C. DACTYLON, (L.). *Panicum Dactylon*, L. Spec. 1753. *Cynodon*, Pers. Syn. i. 1805.

Nassau; Kingston; Lucea.

Chloris, Sw. Prod. 1788.

C. POLYDACTYLA, (L.) Sw. Prod. 1788. *Andropogon*, L. Spec. Ed. 2, 1762. *Andropogon barbatum*, L. Syst. x. 1759.

Nassau; Eleuthera; Lucea; Grand Cayman.

C. BARBATA, (L.) Sw. Fl. Ind. Occ. i. 1797. *Andropogon*, L. Mant. ii. 1771.

Inagua; Kingston.

C. RADIATA, (L.) Sw. Prod. 1788. *Agrostis*, L. Syst. x. 1759.

Nassau; Porus; Bog Walk.

C. CRUCIATA, (L.) Sw. Prod. 1788. *Agrostis*, L. Syst. x. 1759.

Fortune Is.; Inagua.

C. PETRÆA, Sw. Prod. 1788.

Nassau; Eleuthera; Cat Is.; Crooked Is.; Watling's; Port Antonio; Grand Cayman.

C. sp.

Kingston.

Differs from *C. radiata*; leaves very acuminate, sheaths not broad and compressed; culm more slender, spikelets narrower and longer, awns shorter, about length of spikelet, tuft of hairs at base conspicuous, lower glume very acute, upper shortly awned, spikes few.

Bouteloua, Lag "Varied. de Cienc. Liter. 1805."

B. AMERICANA, (L.). *Aristida Americana*, L. Syst. x. 1759; Sw. Obs. t. 2, fig. 2. *B. litigiosa*, Lag. Elech. 1816.

Inagua; Kingston.

Eleusine, Gærtn. Fr. i. 1788.

E. ÆGYPTIA, (L.) Pers. Syn. i. 1805 (*E. Ægyptiaca*). *Cynosurus Ægyptius*, L. Spec. 1753. *Dactyloctenium Ægyptiacum*, Willd. Enum. 1809.

Nassau; Eleuthera; Fortune Is.; Inagua; Kingston; Grand Cayman.

E. INDICA, (L.) Gærtn. Fr. i. 1788. *Cynosurus*, L. Spec. 1753.

Nassau; Eleuthera; Fortune Is.; Inagua; Kingston; Porus; Bog Walk.

Leptochloa, Beauv. Agrost. 1812.

L. MUCRONATA, (Michx.) Kunth, Revis. Gram. 1829. *Eleusine*, Michx. Fl. 1803.

Lucea.

L. VIRGATA, (L.) Beauv. Agrost. 1812. *Cynosurus*, L. Syst. x. 1759.

Bog Walk; Port Antonio; Lucea; Grand Cayman.

Var. GRACILIS, (HBK.) Griseb. Fl. B. W. I. 1864. *Chloris*, HBK. Nov. Gen. i. 1815.

Eleuthera.

Gynerium, Humb. & Bonpl. Pl. Æquin. ii. 1809.

G. SAGITTATUM, (Aubl.) Beauv. Agrost. 1812. *Saccharum*, Aublet, Pl. Guiana, 1775.

Port Morant.

Eragrostis, Beauv. Agrost. 1812.

E. BAHAMENSIS, n. sp. Plate 14.

Inagua.

Cæspitose, prostrate-spreading, or when in more shaded situations, erect; culms 12 to 18 cm. long, stiff and wiry, smooth, striate, glaucous above; leaves linear setaceous, closely involute, lower 1 to 2 cm., upper 4 to 5 cm. long, bearing a tuft of woolly hair at the ligule; spikelets scattered along the upper half of the culm, sessile, single or clustered 2 to 3 together, forming a simple and very strict, interrupted spike, oblong, usually falcate, 25-flowered or less; empty glumes ovate about ½ as long as flowering glume, lower 1-nerved, upper slightly longer and 3-nerved; flowering glumes 3-nerved, strongly compressed, smooth and glaucous; palet a little shorter than the flowering glume, scabrous on the two keels. Growing on rocky soil.

E. BAHIENSIS, (Schrad.) Steud. Glum. 1855. *Poa*, Schrad. in Schult. Mant. ii. 1824.

Grand Cayman.

E. CILIARIS, (L.) Link, Hort. Berol. i. 1821. *Poa*, L. Syst. x. 1759.

Nassau; Eleuthera; Cat Is.; Inagua; Port Morant; Porus; Grand Cayman.

E. MAJOR, Host. Gram. iv. 1809. *Poa Eragrostis*, L. Spec. 1753.
Inagua.

Zeugites, P. Br. Hist. Jam. 1756.

Z. AMERICANA, Willd. Spec. iv. 1805. *Apluda Zeugites*, L. Syst. x. 1759.
Blue Mt. Peak.

Uniola, L. Gen. 1737.

U. PANICULATA, L. Spec. 1753.
Nassau; Eleuthera; Cat Is.; Crooked Is.

Distichlis, Rafin. Journ. Phys. lxxxix. 1819.

D. SPICATA, (L.) Greene, Bull. Cal. Acad. ii. 1887. *Uniola*, L. Spec. 1753. *Distichlis maritima*, Raf. l. c. 1819.
Inagua. In the interior savannas, which appear to be dried up salt marshes.

Poa, L. Gen. 1737.

P. ANNUA, L. Spec. 1753.
Summit of Blue Mt. Peak.

Festuca, L. Gen. 1737.

F. MYUROS, L. Spec. 1753.
Blue Mt. Peak; Bog Walk (R).

Arthrostylidium, Rupr. in Mem. Acad. Petrop. 1839.

A. CAPILLIFOLIUM, Griseb. Pl. Wr. ii. 1862.
Nassau; Cat Is.

Bambusa, Schreb. Gen. Pl. 1789.

B. VULGARIS, Wendl. Coll. Pl. ii. 1810.
Blue Mts. Common in Jamaica.

CONIFERÆ.

Juniperus, L. Gen. 1737.

J. BARBADENSIS, L. Spec. 1753.
Blue Mt. Peak.

Pinus, L. Gen. 1737; Tourn. Inst. 1700.

P. BAHAMENSIS, Griseb. Fl. B. W. I. 1864.
Nassau.

P. sp.
Blue Mt. Peak.

Leaves in two's or rarely in three's, 7 to 9 cm. long, slender, more or less twisted, very concave, margin scabrous, sheath about 6 mm. long. Only one tree, and that without cones, seen between Abbey Green and the summit, near what was apparently an old habitation spot. Seems near *P. inops*, var. *clausa*, Chapm.

Cycas revoluta, Thunb. Fl. Jap. 1784, is rather common in cultivation.

FILICES.

Gleichenia, Smith, Mem. Acad. Turin. v. 1791.

G. LONGISSIMA, Bl. Fil. Java, 1828. *G. Bancroftii*, Hook. Spec. i. 1846.
Blue Mt. Peak.

G. FURCATA, (L.) Spreng. Syst. v. 1827. *Acrostichum*, L. Syst. x. 1759. *G. Mathewsii*, Hook. Spec. i. 1846.
Blue Mt. Peak.

G. PECTINATA, (Willd.) Presl, Rel. Hænk. i. 1830. *Mertensia*, Willd. in Act. Holm. 1804.
Port Antonio.

Cyathea, Smith, Mem. Acad. Turin. v. 1791.

C. ARBOREA, (L.) Smith, l. c. *Polypodium*, L. Spec. 1753.
Blue Mt. Peak; Port Antonio, at about 300 ft. altitude.

C. FURFURACEA, Baker.
Blue Mt. Peak.

This is the same as a specimen bearing the above name, in the Herb. Mo. Bot. Garden, collected by Hart in Jamaica. I have been unable to find that the name is published.

Alsophila, R. Br. Prod. 1810.

A. PRUINATA, (Sw.) Kaulf. Enum. Fil. 1824. *Polypodium*, Sw. Fl. Ind. Occ. iii. 1806.
Blue Mt. Peak; Bog Walk (R).

Hymenophyllum, Smith, in Rœmer Arch. i. 1797.

H. POLYANTHOS, (Sw.) Sw. Fl. Ind. Occ. iii. 1806. *Trichomanes*, Sw. Prod. 1788.
Blue Mt. Peak.

H. FUCOIDES, (Sw.) Sw. Fl. Ind. Occ. iii. 1806. *Trichomanes*, Sw. Prod. 1788.
Blue Mt. Peak.

H. ELEGANTULUM.
Blue Mts.

Identical with a specimen so named in Herb. Mo. Bot. Garden, collected by Hart in Jamaica.

Davallia, Smith, Mem. Acad. Turin, v. 1791.

D. CLAVATA, (L.) Sw. Syn. Fil. 1806. *Adiantum*, L. Spec. 1753.
Nassau, in banana holes.

D. ACULEATA, (L.) Smith, in Mem. Acad. Turin, 1793. *Adiantum*, L. Spec. 1753.
Blue Mt. Peak.

D. FUMARIOIDES, Sw. Fl. Ind. Occ. iii. 1806.
Port Antonio.

Adiantum, L. Gen. 1737; Tourn. Inst. 1700.

A. KAULFUSSII, Kunze in Linnæa, 1848.
Port Antonio.

A. INTERMEDIUM, Sw. in Act. Holm. 1817.
Port Antonio; Port Morant.

A. TETRAPHYLLUM, Willd. Spec. v. 1810.
Jamaica.

A. VILLOSUM, L. Syst. x. 1759.
Lucea.

A. PULVERULENTUM, L. Spec. 1753.
Bog Walk; Porus; Port Antonio.

A. MICROPHYLLUM, Kaulf. Enum. Fil. 1824.
Port Morant.

A. TENERUM, Sw. Prod. 1788.
Constant Springs; Lucea; Bog Walk; Port Morant; Port Antonio (R); Porus.

A. FRAGILE, Sw. Prod. 1788.
Bog Walk; Porus.

Cheilanthes, Sw. Syn. Fil. 1806.

C. MICROPHYLLA, (Sw.) Sw. Syn. Fil. 1806. *Adiantum*, Sw. Prod. 1788.
Bog Walk; Constant Springs.

Pteris, L. Gen. 1737.

P. LONGIFOLIA, L. Spec. 1753.
Nassau; Port Morant; Bog Walk; Lucea; Blue Mt. Peak; Porus.

P. HETEROPHYLLA, L. Syst. x. 1759.
Port Antonio.

P. AQUILINA, L., var. LANUGINOSA, (Bory) Hook. Spec. ii. 1858. *P. lanuginosa*, Bory in Willd. Spec. v. 1810.
Nassau.

Var. CAUDATA, (L.) Hook. Spec. ii. 1858. *P. caudata*, L. Spec. 1753.
Blue Mt. Peak.

P. VISCOSA, (St. Hil.) Baker, Syn. Fil. 1868. *Pœsia*, St. Hil. Voy. Distr. Diam. i. 1833.
Blue Mt. Peak.

P. GRANDIFOLIA, L. Spec. 1753.
Lucea.

P. INCISA, Thun. Fl. Cap. 1807–13.
Blue Mt. Peak.

Lomaria, Willd. Berl. Mag. iii. 1809.

L. ONOCLEOIDES, (Sw.) Spreng. Syst. iv. 1827. *Blechnum*, Sw. Syn. Fil. 1806.
Blue Mt. Peak.

L. PROCERA, (Forst.) Spreng. Syst. iv. 1827. *Osmunda*, Forst. Prod. 1786.
Blue Mt. Peak.

Blechnum, L. Spec. 1753.

B. OCCIDENTALE, L. Spec. 1753.
Lucea; Blue Mt. Peak; Port Antonio; Port Morant (R); Porus.

Asplenium, L. Gen. 1737; Tourn. Inst. 1700.

A. FRAGRANS, Sw. Prod. 1788.
Blue Mt. Peak.

Aspidium, Sw. in Schrad. Jour. ii. 1800.

A. RHIZOPHYLLUM, (Sw.) Sw. Syn. Fil. 1806. *Polypodium*, Sw. Prod. 1788.
Port Antonio; Bog Walk.

A. SEMICORDATUM, (Sw.) Sw. Syn. Fil. 1806. *Polypodium*, Sw. Prod. 1788.
Bog Walk.

A. MURICATUM, (Sw.). *Polypodium muricatum*, Sw. Prod. 1788. *A. mucronatum*, Sw. Syn. Fil. 1806. *P. mucronatum*, Sw. Fl. Ind. Occ. iii. 1806.
Blue Mt. Peak.

A. TRIFOLIATUM, (L.) Sw. Syn. Fil. 1806. *Polypodium*, L. Spec. 1753.
Port Antonio; Porus; Bog Walk.

Nephrodium, Michx. Fl. 1803.

N. PATENS, (Sw.) Desv. Mem. Linn. Soc. vi. 1827. *Polypodium*, Sw. Prod. 1788.
Nassau; Port Morant; Grand Cayman.

N. INVISUM, (Sw.) Baker, Syn. Fil. 1868. *Polypodium*, Sw. Prod. 1788.
Blue Mt. Peak.; Blue Mts.

N. SANCTUM, (Sw.) Baker, Syn. Fil. 1868. *Polypodium*, Sw. Prod. 1788.
Port Antonio.

N. CONTERMINUM, (Willd.) Desv. Mem. Linn. Soc. vi. 1827. *Aspidium*, Willd. Spec. v. 1810.
Blue Mt. Peak.

N. SPRENGELII, (Kaulf.) Hook. Spec. iv. 1862. *Aspidium*, Kaulf. Enum. Fil. 1824.
Blue Mt. Peak.

N. DENTICULATUM, (Sw.) Hook. Spec. Fil. iv. 1862. *Polypodium*, Sw. Prod. 1788.
Blue Mt. Peak; Bog Walk.

N. EFFUSUM, (Sw.) Baker, Syn. Fil. 1868. *Polypodium*, Sw. Prod. 1788.

Bog Walk; Port Morant.

N. SCOLOPENDRIOIDES, (L.) Hook. Spec. iv. 1862. *Polypodium*, L. Spec. 1753.

Port Antonio.

N. UNITUM, (L.) R. Br. Prod. 1810. *Polypodium*, L. Syst. x. 1759.

Grand Cayman.

N. SERRA, (Sw.) Desv. Mem. Linn. Soc. vi. 1827. *Polypodium*, Sw. Prod. 1788.

Bog Walk; Blue Mt. Peak; Porus; Port Antonio.

Varies from 6 inches to 4 feet in height with pinnæ 2 to 12 inches long.

N. MOLLE, (Jacq.) Desv. Mem. Linn. Soc. vi. 1827. *Polypodium*, Jacq. Ic. Rar. 1786–93.

Blue Mts. (R).

N. CICUTARIUM, (L.) Baker, Syn. Fil. 1868. *Polypodium*, L. Syst. x. 1759.

Port Antonio; Bog Walk; Port Morant (low form).

N. MACROPHYLLUM, (Sw.) Baker, Syn. Fil. 1868. *Aspidium*, Sw. Syn. Fil. 1806.

Bog Walk; Port Antonio.

Nephrolepis, Schott, Gen. Fil. fasc. i. 1834.

N. CORDIFOLIA, (L.) Baker, Syn. Fil. 1868. *Polypodium*, L. Spec. 1753. *N. tuberosa*, Presl, Pterid. 1836.

Blue Mt. Peak.

N. EXALTATA, (L.) Schott, Gen. Fil. 1834. *Polypodium*, L. Syst. x. 1759.

Port Antonio; Bog Walk.

N. ACUTA, (Schk.) Presl, Pterid. 1836. *Aspidium*, Schk. Fil. 1806.

Port Morant; Port Antonio.

Polypodium, L. Gen. 1737; Tourn. Inst. 1700.

P. SAGITTATUM, Sw. Prod. 1788. *P. hastæfolium*, Sw. Syn. Fil. 1806. *P. hastatum*, Sw. Fl. Ind. Occ. iii. 1806.

Port Antonio.

P. CRENATUM, Sw. Prod. 1788.
Port Antonio.

P. TETRAGONUM, Sw. Prod. 1788 (as P. 4-gonum).
Lucea; Port Antonio.

Var. MEGALODUM, (Schk.) Baker, Syn. Fil. 1868.
P. megalodum, Schk. Fil. 1806.
Port Morant.

P. TRICHOMANOIDES, Sw. Prod. 1788.
Blue Mts. (R).

P. TAXIFOLIUM, L. Spec. 1753.
Blue Mt. Peak; Lucea.

P. PILOSELLOIDES, L. Spec. 1753.
Port Antonio.

P. LORICEUM, L. Spec. 1753.
Blue Mt. Peak.

P. POLYPODIOIDES, (L.). *Acrostichum polypodioides*, L. Spec. 1753. *P. incanum*, Sw. Prod. 1788.
Port Morant.

P. SQUAMATUM, L. Spec. 1753.
Blue Mt. Peak.

P. AUREUM, L., var. AREOLATUM, (HBK.) Baker, Syn. Fil. 1868. *P. areolatum*, HBK. in Willd. Spec. v. 1810.
Port Antonio.

P. ANGUSTIFOLIUM, Sw. Prod. 1788.
Blue Mt. Peak.

P. PHYLLITIDIS, L. Spec. 1753.
Port Morant; Porus.

P. LANCEOLATUM, L. Spec. 1753.
Blue Mt. Peak.

P. SWARTZII, Baker, Syn. Fil. 1868. *P. serpens*, Sw. Prod. 1788 ("non Forst.").
Constant Springs.

P. LYCOPODIOIDES, L. Spec. 1753.
Port Morant; Port Antonio.

P. CRASSIFOLIUM, L. Spec. 1753.
Blue Mt. Peak.

Gymnogramma, Desv. Berl. Mag. 1811. (*Gymnogramme*, Kunze, Flora, i. 1824.)

G. TARTAREA, (Sw.) Desv., var. ORNITHOPTERIS, (Klotzsch) Baker, Syn. Fil. 1868. *Gymnogramme ornithopteris* Klotzsch in Linnæa, xx. 1847.
Blue Mt. Peak.

G. CALOMELANOS, (L.) Kaulf. Enum. Fil. 1824. *Acrosticum*, L. Spec. 1753.
Port Antonio; Port Morant.

Meniscium, Schreb. Gen. ii. 1791.

M. RETICULATUM, (L.) Sw. Syn. Fil. 1806. *Polypodium*, L. Syst. x. 1759.
Port Antonio.

Antrophyum, Kaulf. Enum. Fil. 1824.

A. LANCEOLATUM, (L.) Kaulf. Enum. Fil. 1824. *Hemionitis*, L. Spec. 1753.
Port Antonio.

Vittaria, Smith in Mem. Acad. Turin, 1791.

V. LINEATA, (L.) Sw. Syn. Fil. 1806. *Pteris*, L. Spec. 1753.
Port Antonio.

Acrosticum, L. Gen. 1737. *Acrostichum*, Halle, Stirp. Helv. i. 1742.

A. LEPIDOTUM, Willd. Spec. v. 1810.
Blue Mt. Peak.

A. AUREUM, L. Spec. 1753.
Port Morant; Grand Cayman.

Anemia, Sw. Syn. Fil. 1806. *Aneimia*, Kaulf. Enum. Fil. 1824.

A. ADIANTIFOLIA, (L.) Sw. Syn. Fil. 1806. *Osmunda*, L. Spec. 1753.
Nassau; Port Morant; Port Antonio; Lucea; Bog Walk.

THE RELATIONS OF THE BAHAMA FLORA.

The Bahama Islands and the supporting banks occupy an irregular triangle, the three angles of which are located approximately as follows;* the northwest part of Little Bahama bank, 27° 25′ north latitude, 79° 10′ west longitude; the southwest part of Great Bahama bank, 23° north latitude, 79° west longitude; Navidad bank a little east and south of 20° north latitude, 69° west longitude. The most easterly islands are, however, the Turk's Islands, about 21° 30′ north latitude, 71° west longitude. The measurements are all taken from the 100 fathom line as in most cases the water abruptly deepens from generally less than 15 fathoms to 100 or 200 fathoms. At the north is Little Bahama bank on which is Great Bahama and Abaco islands, the latter being continued along the northeast edge by a line of cays. This bank is separated from Great Bahama bank by Northeast Providence Channel to the southeast with a least width of twenty-two miles and a greatest depth of 2,222 fathoms, and Northwest Providence Channel to the south with a width of twenty and thirty miles at the east and west extremities and a depth of 1,312 and 439 fathoms. From Florida it is separated by a distance of fifty miles and a depth of 439 fathoms.

Great Bahama bank is deeply indented from the north by the tongue of the ocean having a depth of 740 to 1,200 fathoms. The westerly portion is separated from Florida at the north by forty miles and a depth decreasing from 520 to 460 fathoms. Santarem Channel separates it from Salt Cay Bank to the southwest, width thirty miles, depth 340 to

* The hydrographic data are from United States Coast and Geodetic Survey Charts, Nos. 21, 26a, 944, 946 and 947, which were kindly sent me by the Hydrographer, U. S. N.

360 fathoms. The latter is about the same distance from Cuba, with a channel about as deep. The channel between the Great Bahama bank and Cuba gradually narrows to about twelve miles at its southwestern bend. The shallowest portion is southeast of Salt Cay bank where the greatest depth is about 260 fathoms. The edge of the bank now turns east and the water to the south quickly deepens to 700 and 800 fathoms. The bank extends east nearly to 75° west longitude, then north and west with a long arm lying to the east of the tongue of the ocean, including Long Island, Great Exuma, and at the northwest corner New Providence. This portion is deeply indented from the southeast by Exuma Sound, the bank passing around this, with Eleuthera and Cat Island separating it from the ocean. Exuma Sound has a depth of 800 to 1,000 fathoms. The depth of water over the banks is rarely more than fifteen fathoms.

In a line with this eastern ridge and south of Cat Island are Conception Island, distant twenty miles, and Rum Cay, ten miles further. There is a depth of 800 fathoms between the first two, and 650 fathoms between the second and third. Watling's Island, about seventeen miles northeast of Rum Cay, is quite isolated, being separated from the latter by 1,260 fathoms and from Cat Island by 2,480 fathoms.

East of the southern end of Great Bahama bank lies the Acklin Island group with Crooked Island Passage between. This consists of Crooked, Fortune and Acklin islands. The passage at the narrowest place is about thirty miles wide and a greatest depth of 1,290 fathoms. In a southeasterly direction lie Mariguana, Caicos, and finally Turk's Islands. The deep soundings for the channels separating these are not given on the charts. This extension is separated from Haiti by deep water, mostly over 2,000 fathoms. Inagua, about sixty miles north of the west end of Haiti, is the most southerly island of the Bahamas. The distance from Cuba is about fifty miles and the depth decreases somewhat, the deepest sounding being 1,698 fathoms. From this the

depth decreases going up the Old Bahama Channel to 700 or 800 fathoms south of the Great Bahama bank.

This in a general way shows the relation between the islands forming the Bahamas, and between this group and Florida, and the two islands Haiti and Cuba.

The charts show that there is a submarine ridge connecting Yucatan and Cuba. The shortest distance is about fifteen miles, but the shallowest water lies somewhat to the north with a depth of about 600 fathoms, and an extreme depth* of over 1,000 fathoms. A similar ridge connects Honduras and Jamaica, but the extreme depth is only 700 or 800 fathoms. Jamaica and Cuba are separated by deep water of 1,100 to 2,000 fathoms; Jamaica and Haiti by shallower water, but an extreme depth of over 1,000 fathoms. Cuba and Haiti are connected by a submarine ridge lying north of the shortest line connecting them, which is probably nowhere over 900 fathoms deep. From Haiti through Puerto Rico and the Windward Islands to South America, the islands are not separated by more than 1,000 fathoms of water. There is a narrow channel east of the Virgin Islands which is somewhat deeper, but a narrow ridge separates this from the Caribbean Sea, and connects Puerto Rico with Santa Cruz, which is covered by less than 1,000 fathoms.

If from any cause the depth of the water of the ocean should be lessened by 100 fathoms there would be exposed the Little Bahama and Great Bahama banks and several of the smaller banks to the southeast. The Bahamas would be separated from the surrounding islands and from Florida, and the important channels would still occupy the same places. If reduced by 300 fathoms the Great Bahama bank would be united with Cuba. If the water were 500 fathoms shallower than at present, the Little and Great Bahama banks would be united with Florida, and some of

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* By extreme depth is meant the deepest point on a curve connecting the shallowest points.

the Windward Islands would be connected. It is not, however, till a layer of water 1,000 fathoms deep is removed that important changes would occur. Jamaica would be united with Honduras, Cuba with Florida, and also with South America through the Windward Islands. There would be a narrow channel between Cuba and Yucatan, between Jamaica and Haiti, and a wide and deep channel between Jamaica and Cuba. Watling's, the Acklin Island group and Inagua would still be isolated and the distances between them and the neighboring land would not be materially diminished.

The ocean current flows westward into the Caribbean Sea and also to the north of the Windward Islands, at the rate of one-half to three-fourths knots per hour. It increases in speed as it flows west and north into the Gulf of Mexico, sweeps over the Campeche or Yucatan bank, along the coast of Mexico and finally returns towards Florida, passes between that peninsula and Cuba, then northward along the coast into the Altantic Ocean. The Gulf Stream attains its maximum speed of about five knots per hour along the southern coast of Florida. The portion which flows along the eastern edge of the Windward Islands and the Bahamas, the Equatorial Current, finally joins the Gulf Stream. This is only the general tendency of the currents as less water flows out through the Straits of Florida than can flow in between the Windward Islands.

The prevailing winds in the West Indies are, of course, easterly, but cold winds called "northers" are of frequent occurrence in the northern part in winter.

There have been many speculations concerning the geological history of the West Indian region. To account for the distribution of the fauna and flora, many naturalists have considered the probability of an ancient land connection between the islands and the mainland. It is hardly probable under any theory that the ocean bed below the 1,000 fathom line was ever above water. If that portion within the 1,000 fathom line was ever exposed it must have

since subsided, or, as Belt suggests (The Naturalist in Nicaragua, p. 266 *et seq.* with references), the water may have been withdrawn to form the great ice-cap at the north during the Glacial Epoch. But, in the latter case, the estimated lowering of 1,000 feet (166 fathoms) would lay bare the banks, but would not make any important connections.

The Greater Antilles are of ancient formation and may have been connected with Mexico and Central America, at some remote period. But the Bahamas, the Windward Islands and the southern extremity of Florida are of recent origin. The whole area seems now to be in a process of elevation as shown by the elevated reefs of Cuba and other islands, and by the present growth of the submarine banks as the Yucatan and Bahama banks. From the number of endemic species of Phenogams in the larger islands it is probable that they have been separated from the mainland for some time.

According to Agassiz,* at the time of the elevation of the Isthmus of Panama, the Gulf Stream turned north between Mexico and Cuba and passed around Florida through a much wider channel than now. The Bahama banks and the submarine plateau to the east of the South Atlantic States had already been gradually built up by the lime deposits from the animal life supported by the northern trend of the Equatorial Current. The Gulf Stream now began to build a similar bank to the west of Florida and was active in the southward extension of this peninsula, thus gradually narrowing its channel as it swept through the Straits of Florida. As the channel narrowed the current became swifter and the erosion at the bottom became greater. In this way the plateau was again cut down along the line of the stream, especially between Florida and the Bahama banks.

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* Three Cruises of the U. S. Coast and Geodetic Survey Steamer "Blake."

It would seem to the writer that the ordinary methods of dissemination would account for the flora of the Bahama Islands without calling in the aid of hypotheses founded on ancient land connection. There are probably no more endemic species than would be found if all the islands were at present connected. It seems hardly reasonable to suppose that Watling's, Crooked Island or Inagua have ever been connected with Cuba or any of the other islands, yet the flora of these have about the same relation to Cuba as do the islands of the Bahama bank. From the table it will be seen that the flora comes from the south, that it is essentially Cuban and that this flora has also established itself in the extreme southern part of Florida, where it is found only on the most recent formations. Climatic conditions undoubtedly prevent any great extension to the north, but most of the plants would probably extend further north than they do, were they not brought into competition with an established flora. On the other hand very few plants from the Southern States have found their way to the Bahamas, and those that have are mostly such as are of wide distribution in the Tropics and hence just as probably came from the south as from Florida.

Again, the facilities for distribution, the ocean currents and the prevailing winds, are from the south to the north. The Gulf Stream not only tends to bring plants from the south but quite effectually prevents any from drifting from Florida to the Bahamas. The current is so strong that the occasional northers would be more than counteracted, while the easterly winds are favored. What is true of the Gulf Stream to the west of the Bahamas is also true of the Equatorial Current to the east. Distribution by birds is apparently of little importance or we should find more plants with pulpy fruits brought from Florida. Maritime plants are easily distributed by currents as their seeds are not injured by the salt water, and furthermore, as stated by Hemsley and Wallace, when cast ashore they find a suitable place for germination, while many other seeds

although transported fail to be placed in a favorable situation. I collected several beans of *Gigalobium scandens* on various beaches, but the plant had not gained a foot-hold as its habitat is the dense woods of the larger islands. But the bulk of the flora of the Bahamas is either maritime or such as would, under favorable conditions, be likely to pass through the salt water ordeal successfully. The islands are all low and probably most of the species are found within the influence of the sea.

It will be observed that more species are represented in the collections from New Providence than from any of the other islands, although no more thorough search was made. This is probably due to the fact that Nassau is the chief port of the Colony and the facilities for plant distribution are thus increased.

The following is a tabulated statement of the plants collected in the Bahama Islands showing their distribution, so far as shown by my collections, in the islands visited, and also the occurrence of said species in the adjacent regions. For the latter I have taken as the basis, Grisebach's Catalogus Plantarum Cubensium, Eggers' Flora of St. Croix and the Virgin Islands, Hemsley's Biologia Centrali Americani, and for the United States various works on American botany. The distribution in South America was taken from Grisebach's Flora of the British West Indies.

TABULATED DISTRIBUTION.*

Name of Species.	Nassau.	Eleuthera.	Cat.	Watling's.	Crooked Fortune.	Inagua.	Cuba.	Mex. or Cent. Am.	S. Amer.	Virgin Is.	S. Fla.	
Clematis Flammulastrum		0					0	0				
Argemone Mexicana	0	0			0	0	0	0				1
Lepidium Virginicum	0	0	0			0	0	0		0		1
Gynandropsis pentaphylla	0	0					0			0		1
Myroxylon buxifolium	0						0					
Portulaca oleracea and var.	0	0				0	0	0		0		1, 2
pilosa		0		0	0	0	0	0		0	0	
Malvastrum Americanum	0					0	0				0	
Sida acuminata		0	0		0					0		
ciliaris					0	0	0			0	0	
carpinifolia	0	0				0	0	0		0		
glomerata					0		0	0		0		
spinosa and var		0				0	0	0		0		1, 2
Bastardia viscosa	0						0	0		0		
Abutilon crispum		0					0	0	0		0	
permolle	0	0				0	0				0	
Pavonia Bahamensis					0							
Thespesia populnea	0						0			0		3
Gossypium Barbadense		0			0			0		0		
Helecteres Jamaicensis	0	0				0	0	0		0		
semitriloba						0	0					
Melochia tomentosa and var	0	0	0			0	0	0		0		
nodiflora	0						0	0	0	0		
Waltheria Americana	0	0	0		0		0	0		0	0	
Ayenia pusilla			0				0	0	0	0	0	
Triumfetta althæoides	0	0	0				0	0	0	0		
Corchorus hirsutus		0	0	0	0	0	0			0		
siliquosus	0	0					0	0	0	0		1
Erythroxylum brevipes					0		0					
Malpighia punicifolia				0			0	0	0			
setosa			0				0					
Triopteris Jamaicensis		0	0				0					
Tribulus cistoides					0		0	0	0	0	0	
maximus					0		0	0	0	0		1
Guaiacum sanctum					0		0				0	
Oxalis corniculata var	0						0	0		0		1, 2
Zanthoxylum emarginatum			0				0					
Fagara	0	0	0				0	0			0	
Suriana maritima	0	0	0		0		0			0	0	2
Bursera angustata						0	0					
Simaruba	0	0	0		0		0	0		0	0	
Amyris maritima					0	0	0				0	
Swietenia Mahagoni	0				0	0	0	0	0	0	0	
Maytenus buxifolius			0		0		0					
Crossopetalum Rhacoma			0	0	0	0	0				0	
aquifolium		0					0				0	
Schæfferia frutescens		0					0	0	0	0	0	
Rhamnidium revolutum				0			0			0	0	
Reynosia latifolia		0	0				0			0	0	
Vitis rotundifolia	0											1

* Notes: 1. Extending into Southern U. S., north of semitropical Florida. 2. Widely distributed in the warmer regions. 3. Introduced from the old world. 4. Occurring in Hayti. 5. In the Windward Is. 6. In Jamaica. 7. In Grand Cayman. 8. *Setaria setosa* ranges from Cuba to Mexico and South America. 9. *Pteris aquilina* is widely distributed.

TABULATED DISTRIBUTION — *Continued.*

Name of Species.	Nassau.	Eleuthera.	Cat.	Watling's.	Crooked Fortune.	Inagua.	Cuba.	Mex. or Cent. Am.	S. Amer.	Virgin Is.	S. Fla.	
Cissus rhombifolia	0	0	0	....	....	....	0	0	0	0	....	....
sicyoides	0	....	....	....	....	....	0	0	....	0	0	....
Serjania lucida	....	0	0	....	....	....	0	....	....	0	....	....
paniculata	....	0	0	....	....	....	0	0	0	....	....	....
Cardiospermum Halicacabum	0	....	....	....	....	....	0	0	....	0	0	....
Thyana discolor	0	0	0	....	0	0	....	....	....	....	....	....
Dodonæa viscosa var.	....	....	0	....	....	0	....	....	....	....	....	....
Alvaradoa amorphoides	0	....	....	....	....	....	0	0	....	....	....	....
Rhus oxymetopium	0	....	0	....	0	0	0	....	....	....	....	....
Crotalaria pumila	0	0	0	....	....	....	0	0	....	0	0	....
verrucosa	0	....	....	....	....	....	....	....	....	....	....	3
Indigofera anil	0	0	....	....	....	0	0	0	....	0	....	1
Colinil cinereum	....	0	....	....	....	....	0	0	0	0	....	....
Stylosanthes hamata	0	0	....	....	0	0	0	0	0	0	....	....
Desmodium incanum	0	0	0	....	....	....	0	0	....	0	0	....
Centrosema Virginiana and var.	0	0	0	....	0	0	0	0	0	0	....	1, 2
Clitoria Ternatea	....	....	....	....	....	0	0	....	....	0	....	....
Teramnus uncinatus	0	....	....	....	....	....	0	0	0	0	....	....
Galactia angustifolia	....	....	....	....	....	0	0	....	....	....	....	....
galactioides	....	....	....	0	0	....	0	....	....	....	....	....
Rudolphioides	0	0	0	....	0	....	0	....	....	....	....	....
tenuiflora	0	....	....	0	....	0	0	0	0	0	....	....
Canavali obtusifolia	0	0	....	....	....	0	0	0	0	0	0	....
gladiata	0	....	....	....	....	....	0	0	0	0	....	....
Phaseolus semierectus	0	....	....	....	....	....	0	0	0	0	....	....
Rhynchosia minima	....	....	....	....	....	0	0	0	0	....	....	1
Ichthyomethia Piscipula	....	....	0	....	....	....	....	0	0	0	0	....
Sophora tomentosa	....	....	....	....	0	0	0	0	0	0	0	....
Ateleia multijuga	....	....	0	....	....	....	0	....	....	....	....	....
Cæsalpinia Bonducella	0	0	....	....	....	0	0	0	....	0	0	....
cristа	....	....	....	....	....	0	0	....	....	....	....	....
Cassia Bahamensis	0	0	0	0	....	....	....	....	....	....	0	....
biflora	0	0	....	....	0	0	0	....	....	....	0	....
nictitans	0	0	....	....	....	....	0	0	0	0	....	1
occidentalis	0	0	....	....	0	0	0	0	0	0	....	1
polyadena	0	....	0	....	0	....	0	....	....	....	....	....
Tora	....	0	....	....	....	....	0	0	0	0	....	1
uniflora	0	....	....	....	....	0	0	0	0	....	....	....
villosa	0	....	....	....	....	....	....	0	....	....	....	....
Desmanthus depressus	....	....	....	....	....	0	....	0	0	0	0	....
virgatus	0	0	....	....	....	....	0	0	0	0	0	....
Mimosa Bahamensis	....	....	....	....	0	0	....	....	....	....	....	....
Leucæna glauca	0	0	0	....	0	....	0	0	....	0	0	2
Acacia Farnesiana	0	....	....	....	0	0	....	0	....	0	....	1, 2
Lebbeck	0	....	....	....	....	....	0	....	....	0	....	....
Lysiloma formosa	0	0	....	....	0	....	0	....	....	....	....	....
latisiliqua	....	....	0	....	0	0	....	....	....	....	0	....
Calliandra gracilis	....	0	0	....	....	....	0	....	....	....	....	....
hæmatoma	....	....	....	....	....	0	....	....	....	....	....	4
Pithecolobium asplenifolium	....	0	....	....	....	....	0	....	....	....	....	....
Unguis-Cati	0	0	0	....	0	....	0	....	....	0	0	....
Chrysobalanus Icaco	0	....	....	....	....	....	0	0	0	0	0	....
Bryophyllum pinnatum	0	....	....	....	....	....	....	0	....	0	0	3
Rhizophora Mangle	....	....	0	....	0	....	0	0	....	0	0	....
Buceras angustifolia	....	....	....	....	....	0	0	0	....	0	....	....
Conocarpus erectus and var	0	0	0	0	0	0	0	0	....	0	0	....
Laguncularia racemosa	....	....	....	....	0	....	0	....	....	....	0	....
Eugenia buxifolia	0	....	0	....	0	....	0	....	....	0	0	....
monticola	0	0	....	....	....	....	0	....	....	0	0	....
Tetrazygia bicolor	0	....	....	....	....	....	0	....	....	....	....	....
Parsonsia radicans	0	....	....	....	....	....	0	....	....	....	....	....
Bonara reticulata	0	....	....	....	....	....	0	....	....	....	....	....
Turnera diffusa	....	....	....	....	....	0	0	....	....	....	....	....
ulmifolia	0	0	0	....	0	....	0	0	0	0	....	....
Passiflora ciliata var.	....	0	0	....	0	....	0	....	....	....	....	....
cupræa	0	0	0	....	....	....	0	....	....	....	....	....
fœtida	0	....	....	....	....	....	0	0	0	0	....	....

TABULATED DISTRIBUTION — *Continued.*

NAME OF SPECIES.	Nassau.	Eleuthera.	Cat.	Watling's.	Crooked Fortune.	Inagua.	Cuba.	Mex. or Cent. Am.	S. Amer.	Virgin Is.	S. Fla.	
Passiflora minima	0	0				0	0					
pallida		0					0			0	0	
villosa				0								5
Anguira pedata		0					0	0				6
Cereus Swartzii			0		0	0						
Opuntia spinosissima					0	0				0		
Tuna					0	0	0	0	0	0	0	
Sesuvium Portulacastrum		0	0		0		0			0		1
Exostema Caribæum					0		0	0	0	0	0	
Rachicallis Americana	0						0					
Hamelia patens	0						0	0	0	0	0	
Catesbæa parviflora					0		0			0	0	
Randia aculeata	0	0	0		0		0			0	0	4, 5
Genipa clusiæfolia	0		0	0	0		0				0	
Guettarda calyptrata						0	0					
elliptica	0	0			0	0	0				0	
scabra	0					0	0	0		0	0	
Laugeria densiflora	0						0					
Erithalis fruticosa	0	0	0	0	0	0	0	0		0	0	
Chiococca alba	0	0	0				0	0	0	0	0	
parvifolia	0				0				0		0	5, 7
Phialanthus myrtilloides					0		0					
Strumpfia maritima	0	0		0	0		0				0	
Myrstiphyllum undatum	0	0	0								0	
Ernodea littoralis	0		0	0	0	0				0	0	5, 7
Spermacoce tenuior		0			0	0	0	0	0	0	0	
aspera	0	0	0			0	0		0			
lævis	0						0	0				
thymocephala			0		0		0					
Vernonia Bahamensis			0			0						
Ageratum conyzoides	0				0	0	0	0		0		1
Eupatorium ageratifolium	0						0					
repandum					0		0			0		
villosum	0		0				0				0	
Solidago Domingensis			0		0	0	0					4
Erigeron Canadensis	0		0				0	0		0		1, 2
Baccharis dioica	0	0				0				0		5, 6
Pluchea odorata						0	0	0	0	0		
Parthenium Hysterophorus	0	0	0			0	0	0	0	0		1
Iva cheiranthifolia	0						0					
Ambrosia artemisiæfolia	0						0	0		0		1, 2
crithmifolia	0	0			0		0	0			0	
Xanthium strumarium	0											1, 2
Borrichia arborescens	0		0		0		0			0	0	
Wedelia buphthalmoides	0	0	0									
Eleutheranthera ruderalis		0					0					
Amellus asper	0	0			0		0	0	0	0		
Verbesina encelioides		0					0	0	0		0	
Ucacou nodiflorum	0						0	0	0	0		
Bidens bipinnata	0						0	0	0	0		1, 2
leucantha	0	0						0	0	0	0	
pilosa	0	0						0	0			
Pectis linifolia	0									0	0	
Emilia sonchifolia	0						0			0		
Anastraphia pauciflosculа					0	0						4
Chaptalia nutans	0						0	0	0	0		
Lactuca Intybacea						0	0	0				
Sonchus oleraceus	c	0					0			0		1
Scævola Plumieri		0			0		0	0		0	0	2
Plumbago scandens	0						0	0	0	0	0	
Jacquinia armillaris	0	0	0		0			0	0	0	0	4, 5
Lycioides retusum			0				0					
Mimusops Sieberi					0		0				0	
Diospyros halesioides		0			0		0					
Plumeria emarginata		0					0					
obtusa			0		0	0	0					
sericifolia						0	0					

TABULATED DISTRIBUTION — *Continued.*

NAME OF SPECIES.	Nassau.	Eleuthera.	Cat.	Watling's.	Crooked Fortune.	Inagua.	Cuba.	Mex. or Cent. Am.	S. Amer.	Virgin Is.	S. Fla.	
Echites Andrewsii	0	0	0	0	....	....	0	0	....	0	0	....
Sagræa	0	....	....	....	....	....	0	....	....	....	0	....
suberecta	....	0	....	0	0	0	0	....	....	....	....	....
umbellata	0	0	0	....	0	0	0	0	....	....	0	....
Calotropis procera	....	....	....	....	0	....	....	....	....	0	....	3
Asclepias Curassavica	0	....	....	....	....	....	0	0	....	0	0	....
Metastelma Schlechtendahlii	....	0	....	....	0	0	....	0	....	0	....	....
Vincetoxicum palustre	....	....	....	....	0	0	....	....	....	0	....	1
Spigelia anthelmia	....	0	....	....	0	....	0	0	0	....	....	....
Polypremum procumbens	....	....	....	....	....	0	....	0	....	....	....	1
Cordia globosa	....	....	....	0	....	....	0	0	....	0	0	5
Sebestena	0	....	....	....	....	0	0	....	....	....	0	....
Bourreria Havanensis	0	0	0	....	0	....	0	....	....	....	0	....
Tournefortia gnaphalodes	0	0	....	0	....	0	0	....	....	0	0	....
poliochros	....	....	....	....	0	....	0	....	....	....	....	....
volubilis	0	0	....	....	....	0	0	....	....	0	0	....
Heliotropium Curassavicum	0	....	0	....	0	0	0	0	0	0	0	1
inundatum	....	....	....	....	0	0	0	0	0	....	....	....
microphyllum	....	....	....	....	....	0	0	....	....	....	....	....
parviflorum	0	0	0	....	....	0	0	0	0	0	0	....
Ipomoea Jamaicensis	....	0	....	....	....	....	0	0	0	....	....	....
microdactyla	0	0	....	....	....	....	0	....	....	....	....	....
Pes-capræ	0	....	....	....	0	0	0	0	....	0	....	1, 2
repanda	....	0	0	....	0	....	0	....	....	....	....	1
sinuata	0	0	....	....	....	....	0	0	0	0	....	....
triloba	0	0	....	....	0	0	0	0	....	0	0	....
tuba	0	....	....	....	....	....	....	....	....	0	....	....
Convolvulus Jamaicensis	0	0	0	....	0	0	....	....	....	0	....	....
Evolvulus alsinoides	....	0	0	....	0	0	0	....	....	....	0	....
arbuscula	....	0	....	....	0	0	....	....	....	....	....	....
nummularius	0	0	....	....	....	....	0	0	0	0	....	....
Cuscuta Americana	....	0	....	....	....	....	0	0	....	0	....	....
Solanum aculeatissimum	0	....	....	....	....	....	0	0	0	0	....	1
Bahamense and var.	0	0	0	0	0	....	0	0	....	0	0	....
igneum	....	....	....	0	....	....	0	....	....	....	....	....
nigrum and var.	0	....	....	....	....	0	0	0	....	0	....	1, 2
torvum	0	....	....	....	....	....	0	0	....	0	....	....
verbascifolium	0	0	....	....	....	....	0	0	....	0	0	....
Capsicum frutescens	....	....	....	....	....	0	....	0	0	0	0	5
Datura fastuosa	....	....	0	....	....	....	0	....	....	0	....	....
Metel	....	....	....	....	....	0	0	0	....	0	....	4
Cestrum pallidum	0	....	0	....	....	....	....	....	....	....	....	....
Stemodia durantifolia	....	....	0	....	....	....	0	0	0	0	....	....
maritima	0	0	....	....	....	....	0	....	....	....	....	1, 3
Moniera Brownei	....	....	0	....	....	....	0	0	....	0	....	....
Capraria biflora and var.	0	....	0	0	0	0	0	0	0	0	0	4
Catalpa longissima	....	....	0	....	....	....	....	....	....	0	....	....
Tabebuia Leucoxylon	....	0	0	....	....	....	0	....	....	0	....	....
Tecoma stans	0	....	....	....	....	....	....	0	....	0	0	....
Jacaranda cærulea	....	....	0	....	....	....	....	....	....	....	....	....
Thunbergia alata	0	....	....	....	....	....	....	....	....	0	....	3
Blechum Brownei	0	....	....	....	....	....	0	0	0	0	....	....
Lantana Camara	....	....	0	....	....	....	0	0	0	0	....	1
crocea	0	0	0	....	....	....	0	0	0	....	....	....
involucrata	0	0	0	0	0	0	0	0	0	0	0	....
Lippia nodiflora	0	0	0	....	0	0	0	0	0	0	....	1, 2
Abena Jamaicensis	0	0	0	....	....	0	0	0	0	0	....	....
Priva lappulacea	....	0	....	....	....	0	0	0	0	0	....	....
Citharexylon villosum	0	....	0	....	....	....	0	0	....	0	....	....
Duranta repens	0	0	....	....	....	....	0	0	....	0	....	....
Callicarpa fulva	....	....	0	....	....	....	0	0	0	0	....	....
Petitia Pœppigii	....	0	....	....	....	....	0	....	....	....	....	....
Avicennia nitida	....	....	....	....	0	....	0	0	....	0	0	....
Hyptis pectinata	....	....	....	....	....	0	0	0	0	0	0	....
suaveolens	....	0	....	....	....	....	0	0	0	0	....	....
Salvia serotina	....	0	0	0	0	0	0	0	....	0	0	....
tenella	....	0	....	....	....	....	0	....	....	....	....	....

TABULATED DISTRIBUTION — *Continued.*

Name of Species.	Nassau.	Eleuthera.	Cat.	Watling's.	Crooked Fortune.	Inagua.	Cuba.	Mex. or Cent. Am.	S. Amer.	Virgin Is.	S. Fla.	
Leonurus Sibirica	0						0			0		1
Leonotis nepetæfolia	0	0				0	0			0		1
Teucrium Cubense			0			0	0	0	0			
Boerhaavia paniculata	0	0					0	0		0		
scandens		0					0	0	0			
Pisonia discolor		0	0				0					
obtusata	0				0		0				0	
Amaranthus gracilis		0			0		0			0		
paniculatus					0		0			0	0	
polygonoides		0				0	0	0	0	0	0	
spinosus	0						0	0		0		1, 2
Achyranthes aspera var	0						0	0		0		2
Alternanthera muscoides						0	0					
repens	0						0	0		0		1
Philoxerus vermicularis		0					0	0	0	0	0	
Iresine celosioides		0	0	0			0	0				1
Chenopodium murale		0					0			0		1, 3
Atriplex cristata	0						0			0	0	
Salicornia ambigua					0		0					1
Rivina humilis and var	0		0				0	0		0	0	2
Batis maritima						0	0		0	0		1
Coccoloba uvifera	0		0	0	0	0	0	0	0	0	0	
laurifolia	0	0			0	0	0			0	0	
Nectandra sanguinea	0						0	0	0			
Cassytha filiformis	0	0	0				0	0		0	0	2
Phoradendron tetrastichus					0		0					
Euphorbia Blodgettii	0	0	0		0	0					0	
buxifolia	0	0	0	0	0	0	0	0	0	0	0	
heterophylla and var	0	0	0		0	0	0	0	0	0		1
hypericifolia	0	0				0	0	0	0	0		1
pilulifera	0	0	0			0	0	0	0	0	0	
punicea					0	0	0					
Phyllanthus epiphyllanthus	0	0	0	0	0	0	0			0		
Niruri					0	0	0	0	0	0	0	2
Jatropha gossypifolia	0						0	0	0	0	0	
Croton Cascarilla and var	0	0	0	0			0				0	
Eleuteria		0										
Hjalmarsonii					0	0						
humilis and var			0					0		0	0	1
Argythamnia candicans			0	0			0	0		0		
Bernardia Mexicana		0	0				0	0	0			
Acalypha alopecuroides	0	0					0	0	0			
Hippomane Mancinella						0	0	0	0	0	0	
Gymnanthes lucida		0					0			0	0	
Trema Lima	0	0					0	0	0	0	0	
Ficus lævigata					0		0			0		
dimidiata		0					0					
pertusa			0				0		0			
Fleurya æstivans	0						0	0	0	0		
Pilea microphylla	0						0	0		0		
Rousselia lappulacea	0						0			0		
Epidendrum altissimum		0	0									
virens			0			0	0	0				
Tillandsia Balbisiana	0						0					
bulbosa			0			0	0	0	0		0	
fasciculata					0	0	0	0	0			
flexuosa						0	0	0	0	0		
recurvata			0				0	0	0	0	0	
utriculata			0			0	0				0	
Agave sobolifera		0	0				0			0		
Rajania hastata	0		0				0			0		
Smilax Domingensis	0		0		0		0					
Havanensis	0						0	0		0	0	
Commelina nudiflora	0						0			0		1
Rhœodiscolor	0						0	0		0		
Sabal umbraculifera			0				0					
Thrinax argentea		0	0				0	0		0	0	

TABULATED DISTRIBUTION — *Continued.*

NAME OF SPECIES.	Nassau.	Eleuthera.	Cat.	Watling's.	Crooked Fortune.	Inagua.	Cuba.	Mex. or Cent. Am.	S. Amer.	Virgin Is.	S. Fla.	
Thrinax parviflora	...	...	...	0	...	...	...	...	...	0	0	4
Cyperus aristatus	...	...	0	...	...	0	0	0	0	...	...	...
brunneus	0	0	0	...	0	0	0	0	...	0	0	...
filiformis	0	...	...	...	0	...	0	...	...	0	0	...
ligularis	0	...	...	...	...	0	0	0	0	0	0	...
rotundus	0	...	...	...	...	...	0	...	...	0	...	1
viscosus	...	0	...	...	...	0	0	0	0	0	...	...
Eleocharis capitata	...	...	0	...	...	...	0	0	...	0	...	1, 2
cellulosa	...	...	...	...	...	0	0	...	...	...	...	1
Dichromena colorata	0	...	...	...	0	0	0	0	0	...	...	...
Iria ferruginea	0	...	...	...	...	0	0	0	...	0	...	...
spadicea	0	...	0	...	0	0	0	0	0	...	...	1
Rhynchospora cyperoides	...	...	...	...	...	0	0	...	...	...	...	...
Cladium Mariscus	0	...	...	...	0	...	0	0	0	...	...	...
Scleria filiformis	0	0	...	...	...	...	0	...	...	0	...	...
Paspalum cæspitosum	0	...	0	...	...	0	0	...	...	...	0	...
distichum	...	...	...	...	0	...	0	0	...	0	...	1, 2
fimbriatum	0	...	...	...	...	...	...	...	0	...	...	5
glabrum	...	0	0	0	0	0	0	...	...	0	...	...
nanum	...	...	...	...	...	0	0	...	...	...	...	...
Panicum dichotomum var	...	...	...	...	0	...	0	...	...	...	...	...
distantiflorum	...	...	...	...	...	0	0	...	...	...	...	...
divaricatum	0	0	0	...	0	...	0	...	...	...	0	...
horizontale	...	0	...	...	...	...	0	...	...	...	...	2
insulare	...	0	0	...	...	...	0	...	...	...	...	...
Linkianum	0	0	...	...	0	0	0	...	...	...	...	...
maximum	0	...	...	...	0	...	0	0	0	0	0	...
molle	0	...	...	...	...	...	0	0	0	0	...	1
paspaloides	...	...	...	...	0	0	0	0	0	0	0	...
Setaria caudata	...	0	...	...	...	...	...	0	0	0	...	8
glauca	0	0	...	...	...	0	0	...	...	0	...	1
Cenchrus echinatus and var.	0	0	...	...	0	0	0	0	0	0	...	1
tribuloides	0	...	...	...	0	0	...	0	0	...	...	1, 2
Stenotaphrum Americanum	0	...	...	...	...	...	0	0	...	0	...	1, 2
Andropogon glomeratus	0	0	...	...	0	0	0	0	...	...	...	1
Aristida scabra	0	0	0	...	0	...	0	...	...	...	0	...
stricta	...	...	...	...	0	...	0	0	...	0	...	1
Sporobolus Domingensis	...	0	...	...	0	0	...	0	...	...	0	4
Indicus	...	0	...	...	...	...	0	0	...	0	...	1, 2
Jacquemontii	...	0	...	...	...	...	0	...	...	...	...	...
Virginicus	0	...	...	...	0	0	0	0	...	0	...	1, 2
Capriola Dactylon	0	...	...	...	...	...	0	0	...	0	...	1, 2
Chloris barbata	...	...	...	...	...	0	...	...	0	...	...	6, 3
cruciata	...	...	...	...	0	0	0	...	...	...	...	...
petræa	0	0	0	0	0	...	0	0	0	...	...	1
polydactyla	0	0	...	...	...	...	...	0	0	...	...	6
radiata	0	...	...	...	...	...	0	0	0	0	...	...
Bouteloua Americana	...	...	...	...	...	0	...	...	0	0	...	5, 6
Eleusine Ægyptia	0	0	...	...	0	0	0	0	...	0	...	1, 2
Indica	0	0	...	...	0	0	0	0	...	0	...	1, 2
Leptochloa virgata	...	0	...	...	...	...	0	0	0	0	...	...
Eragrostis Bahamensis	...	...	...	...	...	0	...	...	...	...	...	...
ciliaris	0	0	0	...	...	0	0	0	0	0	...	1
major	...	...	...	...	...	0	...	...	...	...	...	2
Uniola paniculata	0	0	0	...	0	...	0	0	0	...	...	1
Distichlis spicata	...	...	...	...	...	0	...	...	...	...	...	1
Arthrostylidium capillifolium	0	...	0	...	...	...	0	...	...	0	...	...
Pinus Bahamensis	0	...	...	...	...	...	...	...	...	...	...	...
Davallia clavata	0	...	...	...	...	...	0	...	...	...	...	5
Pteris aquilina var. lanuginosa	0	...	...	...	...	...	...	0	...	...	...	9
longifolia	0	...	...	...	...	...	0	0	0	0	0	...
Nephrodium patens	0	...	...	...	...	...	0	0	0	...	0	1
Anemia adiantifolia	0	...	...	...	...	...	0	0	0	...	...	...

From the above table the following condensed statements can be gleaned:—

Total in the Bahamas	380
Of which are found also in Cuba	321
" " " Mexico or Central America	197
" " " South America	117
" " " Virgin Islands	207
" " " South Florida	129
" " " Southern United States	68
Found in Cuba and also Mexico or Central America	718
" " " South America	103
" " " Virgin Islands	186
" " " South Florida	111

The 59 found in the Bahamas and not in Cuba are distributed as follows:—

Peculiar to Bahamas	13
Found also in Mexico	2
" " South America	2
" " Virgin Islands	7
" " South Florida	4
" " Southern United States	3
" " Mex., S. A., Virgin Is. and S. Fla	5

The remainder are distributed in various ways.

The 68 found in the Bahamas and the United States north of semi-tropical Florida are distributed as follows:—

U. S. and Bahamas	3
" " " Cuba and Virgin Islands	9
" " " " Virgin Is. and Mex. or Cent. Am	22
" " " " " Mex. or Cent. Am. and S. A	17
" " " " Mex. or Cent. Am. and S. A	4

The remainder variously distributed.

Of the 68 common to the Bahamas and Southern U. S. 58 are found also in Cuba. The three confined to the Bahamas and U. S. are *Xanthium strumarium*, introduced from the old world, *Vitis rotundifolia* and *Distichlis spicata*. The *Vitis* may have been carried by birds. The *Distichlis*

has a wide range in North America, but it is difficult to account for the isolated occurrence in Inagua.

A similar calculation has been made for the additional species found in Brace and Gardiner's List of the Plants of the Bahama Islands. These were not included in the tabulated statement as the distribution on the islands is not given and the distinction between cultivated and native or naturalized species is not always clear.

Total	175
Common to Bahamas and Cuba	129
" " " Virgin Islands	84
" " " Mexico or Central America	88
" " " South America	82
" " " South Florida	39
" " " Southern United States	17

All of the 17 extending into the Southern United States are found also in the tropics to the South.

EXPLANATION OF PLATES ILLUSTRATING WEST INDIAN PLANTS.

The figures were drawn, under supervision of the Director of the Garden, by Miss Grace E. Johnson.

Plate 11, *Pavonia Bahamensis*, Hitchc. — Portion of fruiting plant, reduced one-half; branch, natural size; and carpel, enlarged.

Plate 12, *Anastraphia pauciflosculа*, Wright. — Portion of plant, reduced one-half; four leaves, natural size; a flower, two anthers and style enlarged.

Plate 13, *Euphorbia Blodgettii*, Engelm. — Habit, reduced one-half; part of plant, natural size; leaves, stipules, involucre and appendages, and seeds, enlarged.

Plate 14, *Eragrostis Bahamensis*, Hitchc. — Habit, reduced one-half; flowering portion, natural size; spikelet, and opened glume and palet, enlarged.

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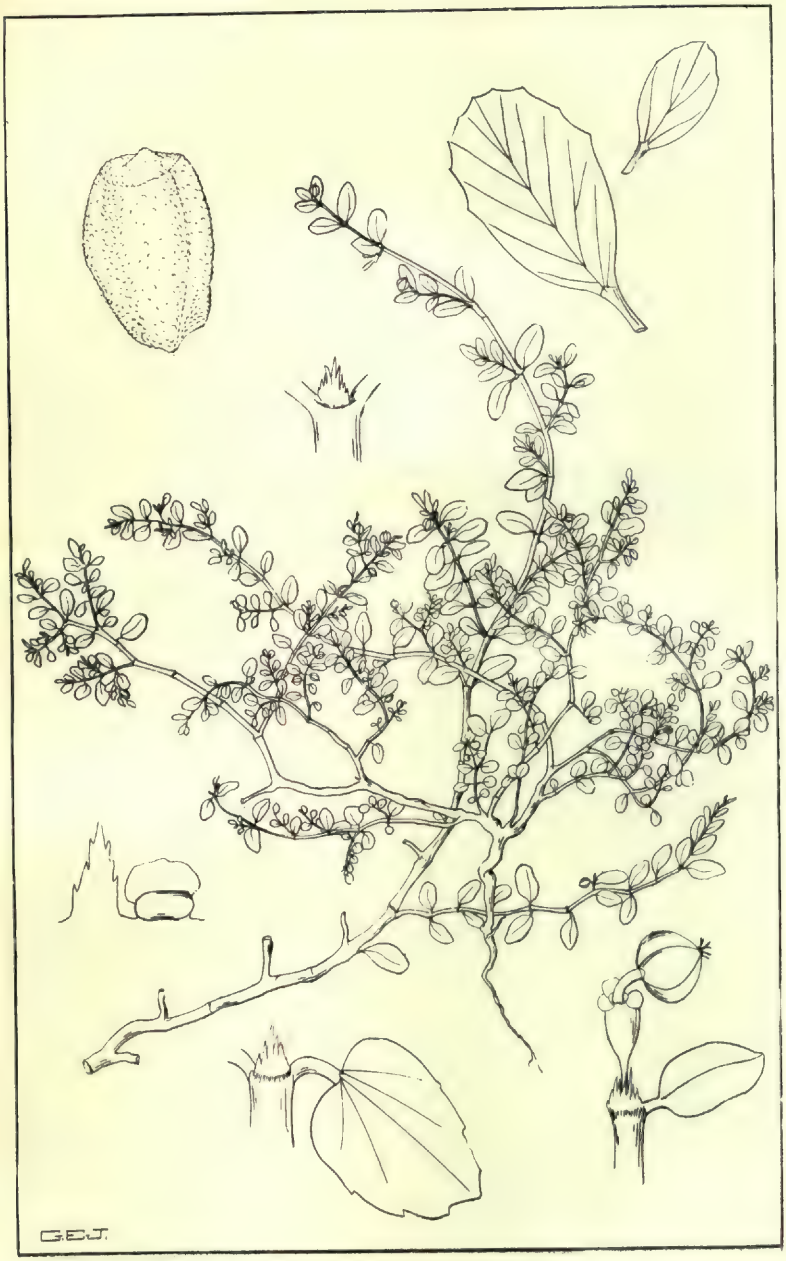
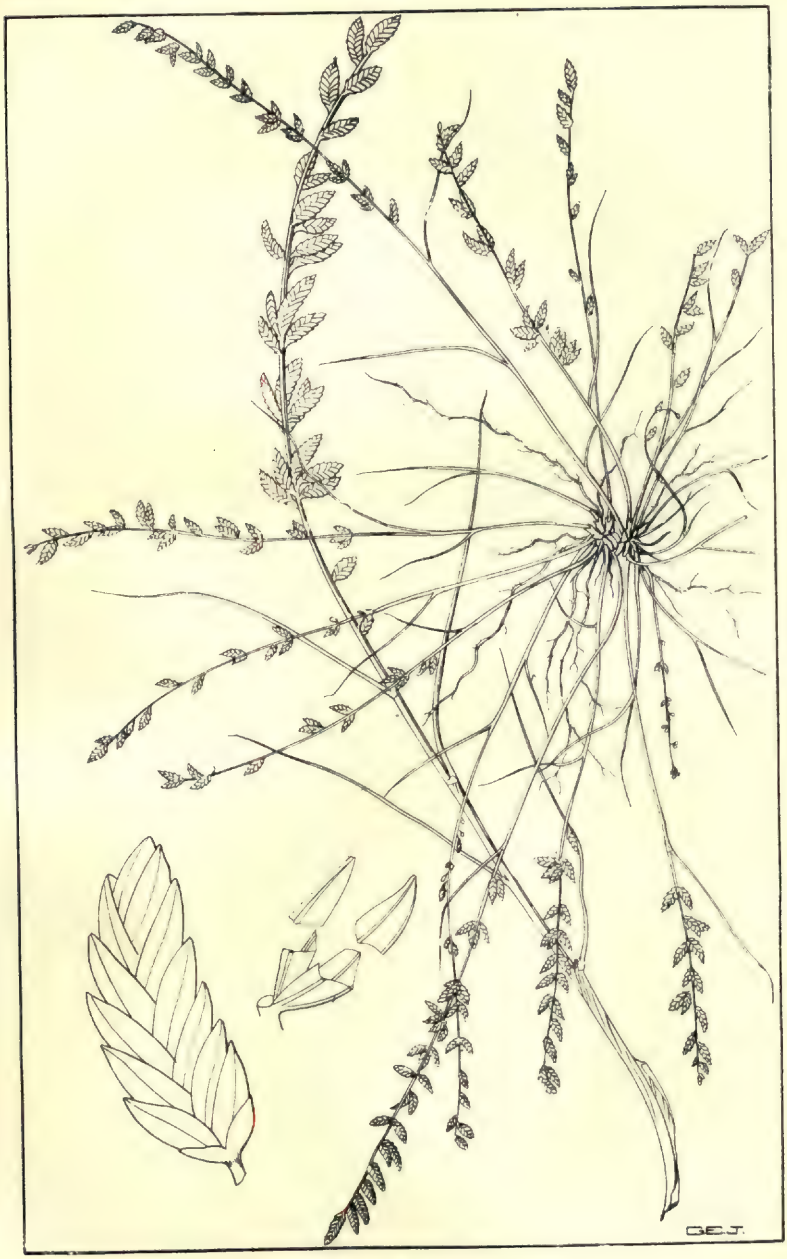
ANASTRAPHIA PAUCIFLOSCULA.



EUPHORBIA BLODGETTII.



ERAGROSTIS BAHAMENSIS.

FURTHER STUDIES OF YUCCAS AND THEIR POLLINATION.

BY WILLIAM TRELEASE.

Among the many strange things brought to light by biological studies, few equal in interest or verge so closely on the improbable as those which concern the pollination of the Yuccas. The observed facts, chiefly known through the work of Professor Charles V. Riley and the late Dr. George Engelmann, have been admirably summarized by Professor Riley in the Third Report of the Garden.* So far as direct observation on pollination is concerned, these refer to cultivated specimens of *Y. filamentosa* and *glauca*, the latter of which has been observed also in the wild state in Colorado;† but the collections of entomologists, and the affected fruits of the Yuccas of various localities, show that virtually all species of the genus depend for their principal pollination, if not altogether, upon moths of the Tineid genus Pronuba, of which Riley has characterized three species.‡ Professor Riley, therefore, states that all of the species of Yucca native east of the Rocky Mountains depend for their pollination, so far as is now known, upon a single species of Pronuba, namely the white *P. yuccasella*,§ while the tree Yucca of the California desert and the adjacent region, *Y. brevifolia*, is pollinated by a dingy moth, *P. synthetica*,‖ and the aberrant *Yucca Whipplei*, which Mr. Baker is now disposed to place in a distinct genus under the name Hesperoyucca, is pollinated by an equally aberrant spotted moth, *P. maculata*,¶ the pollinating actions of which have been briefly reported this season by Coquillet.** Aside from this

* pp. 99 to 158, pl. 34 to 43. † Riley, *l. c.* 124. ‡ *l. c.* 137.

§ *l. c.* 104, 121; Proc. Biological Society of Washington, vii. 94; Insect Life, iv. 369. ‖ *l. c.* 121, 141. ¶ *l. c*, 121, 139.

** Insect Life, iv. 370, note.

nothing definite has been made known concerning either the Pronubas which frequent the several species of Yucca, or their mode of operation, although Riley predicts the probable discovery of distinct species of Pronuba for the Mexican *Y. filifera** and our own *Y. rupicola*,† *Y. Treculeana*,† and *Y. baccata*.‡

The following pages contain the results of a further field study which I have been enabled to make during the spring of 1892, through the interest of the Board of Trustees of the Garden. In bringing the observations together, they have been arranged under the respective species studied, the classification of the latter being substantially that employed in the detail illustrations of the last volume. §

YUCCA.

Filaments nearly or quite free from the petals; pollen powdery; style stout, not capitately expanded nor long-papillate, with a rather open stigmatic axile canal; fruit baccate, spongy, or capsular with septicidal and apical-loculicidal dehiscence.

A. SARCOYUCCA, *with fleshy fruits.*

Y. ALOIFOLIA, L. (Pl. 18).—According to Riley,‖ individuals of this species which bloom simultaneously with *Y. filamentosa* along the southeastern coast, are pollinated by *Pronuba yuccasella*. The species is, however, quite unique in setting good fruit rather abundantly in cultivation when Pronuba does not appear to be present.¶ This was the case in the Garden this year, when the species

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* *l. c.* 121. † *l. c.* 122. ‡ Proc. Biol. Soc. Washn. vii. 96.

§ Third Report Mo. Bot. Garden, 161. ‖ *l. c.* 121.

¶ The principal references to the fruiting of *aloifolia* without Pronuba are the following: Deleuil, Rev. Horticole. —abst. in Gard. Chron. 1880, xiii. 807; Engelmann, Gard. Chron. 1872, 941, Collected Writings, 284; The Garden, *fide* Vick's Mag. 1880 and Riley in Proc. Amer. Ass. Adv. Sci. xxix. 624; Gardeners' Chronicle, 1880, xiii. 81; Riley, Third Garden Report, 118 etc.; J. v. V. [van Volxem], Gard. Chron. 1882, xviii. 407. The note of Layard in Nature, xxii. 606, may perhaps refer to this species, though the species is not named.

bloomed for the first time in several seasons, and a number of the panicles fruited quite freely. The earliest of these flowers opened as the last flowers of *filamentosa* were falling, so that it was supposed at first that they were pollinated by *P. yuccasella*, which had been observed only a few days previously, but this supposition was not substantiated by the discovery of the moth about them, or of its larvæ in the fruit.

Professor Riley has shown that the short style and open stigma of *aloifolia* appear to favor self-pollination when the moth is not present; but a study of our plants this summer by Mr. Webber and myself has not satisfied either of us that self pollination is likely to occur sufficiently frequently to explain the rather abundant fruiting observed here, and in the case of a single panicle covered with gauze, no fruit was set except as the result of artificial pollination. The so-called Yucca hybrids of gardens appear for the most part if not always to be spontaneous or artificial crosses between the variegated and other forms cultivated under various names, but now generally referred to this species. Altogether *Y. aloifolia* is one of the species most worthy of study in its native habitat, since little is known except that it sometimes fruits without the aid of Pronuba, and that its seeds sometimes contain the larvæ of *P. yuccasella*, while the exact mode of pollination when the moth is excluded is not known from observation.

It is well known that *filamentosa*, when cultivated far north of its range, is uncertain in its blooming, although further south it flowers every year; and attention has been called frequently to the periodicity of *brevifolia* and other species in their native home.* No doubt this is connected with the previous conditions of nutrition, and the immediate climatic influences under which the plants have grown, but it appears quite remarkable that so many plants of *aloifolia* at the Garden, of very different size and age,

* Riley, *l. c.* 117.

should have bloomed together this year, after a long period of rest.*

The most striking morphological peculiarities of the species, aside from its rather stiff sword-shaped denticulate leaves, are the marked stipe of the ovary, and the decidedly hexagonal cross section of the ripening fruit, due to the rapid growth of the nectar grooves,— both of which features are well shown on plate 44 of the Third Report.

Y. YUCATANA, Engelm.— So far as I can learn, nothing is known of this species further than that it was collected in Yucatan by Schott, whose specimens are preserved in a few herbaria.

Y. GUATEMALENSIS, Baker (Pl. 1, 2, 19).—This species is said to occur in southern Mexico, as well as Guatemala. In August and September, 1892, a fine plant, said to have come originally from Haage and Schmidt as a Furcroea, bloomed in the Garden, synchronously with a form of *gloriosa*, but fully a month later than *aloifolia*. The pollination arrangements appear to be almost identical with those of *baccata*, which are described below. In this specimen the septal nectar glands, although they are not very large, were more active than those of any other true Yucca known to me, and their secretion appeared in rather copious drops at the base of the ovary, where the nectar grooves open, or in smaller drops near its top, where the glands open into the grooves, if, as frequently happens, the latter have spread somewhat. Artificial pollination gave a number of the very large pendent baccate fruits, but nothing is known of the natural pollinators of the species.

The fruit raised by artificial pollination is very stout. One of the larger (but not the largest) of the specimens measured $2 \times 3\frac{1}{2}$ in. and weighed, while still green, 6 oz. At first quite hexagonal in cross section, its intercarpellary facets ultimately disappear toward the base. The bases of the filaments are adherent to the base of the fruit, much

* Meehan (Monthly, ii. 190) mentions a plant which flowered for the first time when at least seventy-five years old.

as in *aloifolia*, and similarly reflexed. When fully grown, but not ripe, the fruit is of a clear apple-green color.

Y. SCHOTTII, Engelm. (*Y. macrocarpa*, Engelm.) (Pl. 3). — Though *Y. macrocarpa*, which appears to be only this species, is not uncommon in parts of southern Arizona, no observations have been made on its pollination, and I was unable to find it in bloom. Flowers collected in the Santa Rita Mountains, July 9, 1881, and in the Huachuca Mountains in September, 1882, show either an unusual duration of the flowering period, or great variability in it. *Y. elata* and *Y. baccata*, which are spring-blooming species of the same region, are pollinated by *Pronuba yuccasella*, which can scarcely be expected to occur as late as the dates mentioned; but *baccata*, in different localities, is known to have a prolonged period of blossoming comparable with that of the different forms of *filamentosa* in the southeast, so that it is possible that in its pollination arrangements *Schottii* bears the same relation to *baccata* that the autumnal *gloriosa* does to *filamentosa*.

Y. TRECULEANA, Carr. (Pl. 18). — This Texan and Mexican species is believed by Riley to be pollinated by a probably distinct Pronuba,* but no observations have been made on it. A specimen which bloomed in the Garden this season was quite as sterile as other cultivated Yuccas aside from *filamentosa* and *glauca*, which are pollinated by *P. yuccasella*, and the *aloifolia* noted above; and this has been the case on the several occasions when the specimen has bloomed in the past.

According to Engelmann† *Treculeana* is reported by Lindheimer as sterile in Texan gardens, though the wild plants are abundantly fertile.

Y. BACCATA, Torr. (Pl. 20).—With the possible exception of *Y. glauca*, this is the most widely distributed of our species, ranging in a variety of forms from southern Colorado into Mexico and to California, where it extends

* *l.c.* 122; Proc. Biol. Soc. Washn. vii. 96; Insect Life, iv. 371.

† Collected Writings, 284.

from about Monterey into the peninsula. It therefore connects the territory of *glauca*, which is pollinated by *Pronuba yuccasella*, with that of two Californian species pollinated by very distinct moths. No observations appear to have been made heretofore on its pollination, nor has any Pronuba been taken on its flowers, but Professor Riley predicts the probable discovery of a distinct species for it.*

In the valley between San Bernardino and Colton, California, *baccata* is found in some abundance, but no Pronuba was seen in any of the specimens examined about the middle of April, when they were in full bloom, and they are said never or very rarely to fruit there, by Mr. S. B. Parish, in whose company my observations on this occasion were made.

About Banning and Cabazon, on the western edge of the Colorado desert, where the plants are more abundant and of larger size, often with a trunk five or six feet high, they are more generally fertile, and a quantity of fruits of the preceding year were collected from the crowns of leaves into which they had fallen on maturity, and where they had been protected from rodents. Most of these fruits were strongly constricted about the middle, and perforated in places, where the larvæ of a Pronuba had escaped. The plants were not blooming very freely this year, but several specimens of a white Pronuba were taken resting in the flowers, and though numerous panicles had bloomed without setting any fruit, others were sparingly, and still others abundantly, fertilized, and the ovaries of the fertilized flowers showed unmistakable constrictions or indentations indicative of the oviposition of Pronuba; still, the moths were not sufficiently numerous to render night observations on their work possible.

A number of blooming plants of *baccata* were examined about the first of May on the mesas back of San Diego, where, notwithstanding the more southern latitude, the

* Proc. Biol. Soc. Washington, vii. 96.

season is later than on the desert and in the warmer valleys further north. On this occasion I was accompanied by Mr. C. R. Orcutt, who informs me that the seeds of *baccata* are in some seasons very much eaten by larvæ, probably of Pronuba;* and the cluster of perforated fruits figured on the accompanying plate was photographed many years ago in the same region. Though the oldest pistils were less developed here that at Cabazon, there was abundant evidence that they had been oviposited in by Pronuba, several individuals of which were taken in the flowers.

The flowers of this Yucca, though they are as variable in form as those of the eastern capsular species, agree, so far as I have observed, in having the sepals decidedly umbonate at the base, as is also frequently the case with *aloifolia*, so that each flower appears somewhat as if constricted immediately above the bottom. In color they range from creamy white, often with a tinge of green, to a decided brown purple, the perianth being always very glossy, and they are slightly and delicately fragrant. The minutely papillate filaments vary much in length, but commonly reach to about the base of the style, where they are more or less abruptly thickened and bent outwards. In one observed case, however, they were as long as the entire pistil. A curious feature observed in dried specimens as well as in recently fertilized flowers with drying stamens, is the strong recurving of the upper part of the filaments shown on plate 48 of the last Report, but never observed in fresh unfertilized flowers, as it often is in *Y. Treculeana*.

The anthers do not appear to dehisce quite as promptly as in the *filamentosa* group, where there is practically no dichogamy, so that in this species the Pronuba is more likely of necessity to have derived her load of pollen from another flower when she begins pollination on one which is newly expanded; but the protogyny noted scarcely extends beyond the evening on which the flower opens, so that it is

* Specimens of old fruit received since the above was written are badly infested by an undetermined beetle.

by no means as effective in preventing close fertilization as in *brevifolia* and *Whipplei*, which are described below. The bright golden yellow pollen is readily seen on any part of the flower in contact with which it may have come, and particularly, on the nearly white ovary and the pure white style.

The latter is not usually as long as in the flower figured in the last Report and already referred to. It has a very open stigmatic tube which passes into the upper ends of the ovarian cells, as may be seen in some cases even by looking down the wide channel with the aid of a hand lens, for there is little stigmatic secretion. In this species it is also very easy to convince oneself that the three pollen-conducting grooves, similar to those figured by Webber for *glauca** but also seen in Agave and other plants with this type of pistil, are formed by the uppermost part of the infolded edges of the carpels, which further down coalesce to form the true septa, and constitute the placentæ. As in other Yuccas, each septum of the ovary contains a nectar gland;† but the glands of *baccata* are not so large and open as in the *filamentosa* group of species, in this respect agreeing with those of the other fleshy-fruited Yuccas that I have examined. Notwithstanding this, they appear to be rather more active than in the former group (herein agreeing with *Guatemalensis* among the baccate species, *gloriosa* among the spongy-fruited species, and the Hesperoyuccas), their secretion sometimes appearing in small quantity at the base of the pistil, where their large ducts discharge. Several of the flowers examined at San Diego in the morning were very wet on the outside, a condition which has been observed on other species;‡ but though it is

* American Naturalist, 1892, 303, 309, pl. 13, f. 38.

† Trelease: Bulletin of the Torrey Bot. Club, 1886, 135, and Third Garden Report, pl. 53; Riley, *l. c.* 109, Proc. Biol. Soc. Washington, vii. 91, and Insect Life, iv. 364 to 366.

‡ *Y. filamentosa*,— Meehan, Proc. Phila. Acad. 1888, 276, and Trelease, Third Garden Report, 123; *Y. gloriosa*,— Meehan, Proc. Phila. Acad. 1880, 355, 1883, 191; and *Hesperoyucca*, mentioned below.

pretty clear that this fluid is not derived from the septal glands, its source is not evident.

A number of small beetles and flies visit the flowers, apparently attracted by the pollen, which in some cases they have been seen to eat. As was noted last year for *glauca*,* these insects sometimes dislodge masses of pollen from the anthers, and the length of the stamens in *baccata* may frequently cause some of this to fall upon the tips of the stigmatic lobes. In one case a small mass of pollen was found in this position, and, in another, some pollen had been pushed into the mouth of the stigmatic chamber, evidently having fallen upon the petals and been transferred to the stigma by the pressure of my hand as I gathered the flower. In some such way, therefore, perhaps exceptional pollination may be effected now and then in *baccata* when Pronuba is not present; but I should not expect this to be of frequent occurrence, and the observations at Colton show that it must be rare or ineffective.

The moths taken in the flowers of this species at Cabazon and San Diego are somewhat larger than many specimens of *Pronuba yuccasella*, and they appear to have the tip of the abdomen, the maxillary palpi, and the antennæ, as well as the chitinized parts in general when denuded, a little darker in color, but aside from these and the greater ease with which their scales are rubbed off, I can detect no characters by which they can satisfactorily be separated from *P. yuccasella* of the Mississippi Valley and Rocky Mountains, which is also said to be indistinguishable from the moth of the Gulf region.† Like the eastern representatives of *yuccasella* they rest within the flowers during the day, with their heads directed toward the base of the stamens, though they seem a little more ready to drop from the flowers when disturbed. Unfortunately I have been able to make no observations on their work, but the females bear loads of pollen of the usual form, and fertil-

* Cf. Riley, *l. c.* 125.

† Professor Riley has since confirmed this conclusion.

ized flowers show conclusively that they thrust this well into the stigmatic canal,— in some cases apparently even into the top of the ovarian cells, which, owing to the short style and the deep stigmatic notches, they can reach easily with their long maxillary tentacles. In ovipositing, they doubtless back down between the upper ends of the stamens, and the ovary is pierced at about its middle. The septa, and the median line of each cell (which is produced into the cell as a false dissepiment, dividing the cell into two), being covered by the appressed lower part of the filament, the moth is constrained to puncture the wall part way between the true and false partitions, as she commonly does in *filamentosa*,* this being also its thinnest part. At San Diego, where the moths were more abundant than at Banning, as many as three to five punctures in a vertical series were seen several times in one cell of an ovary, the other cells sometimes showing none at all.

The compound microscope reveals the presence of pollen in the stigmas of all such flowers punctured for oviposition as I have examined, and a hand lens commonly shows it, though not always. The open stylar canal is frequented by large numbers of a white Thrips, which sometimes penetrate into the cells of the ovary, and doubtless scatter the pollen greatly, perhaps devouring some of it. On dried fruits of the preceding season, the perforations made by escaping larvæ are commonly elevated, the uninjured tissue evidently shrinking more in drying than that immediately surrounding the tunnel of the larva. These dried fruits sometimes show constrictions corresponding to the points of oviposition, but they are frequently obliterated in the development of the pulpy exocarp.

Y. AUSTRALIS, (Engelm.). (Pl. 4, 5).—A study of material on the Sierra Blanca plateau of southwestern Texas, and a careful review of the literature of the species related to *baccata*, enables me to fix without further ques-

* Riley, *l. c.* pl. 36, f. 2.

tion the name *filifera* for the large Mexican "palma" with drooping panicle, for it has satisfied me that the greater part of Engelmann's *Yucca baccata*, var. *australis* consists of another form (from which perhaps one other species with erect panicle, in the upper Mexican plateau, may be separated ultimately). *Y. australis* is the large Yucca collected by Thurber about Parras, Coahuila, in November, 1852 (no. 1857, in Herb. Torrey.),* and said to become sometimes thirty feet high and two or three feet in diameter, by Bartlett,† who figures a much branched large specimen. It is also mentioned by Baker in the Gardeners' Chronicle for 1870, p. 1088, under the number 26, but without name; and by Engelmann (cf. Collected Writings, p. 292), as a variety under *baccata*. So far as I can judge from herbarium material, it was collected in Mexico by Coulter (no. 1571 in Hb. Gray.), and it appears to be the plant collected in the Carneros Pass, Coahuila, by Pringle in 1889 (no. 2841) and 1891 (no. 3912). It appears, therefore, to be a species of the northern high lands of Mexico, extending into the elevated Sierra Blanca region of Texas, where it is associated with other southern plants like *Agave applanata* and *A. Poselgerii*. Its nearest described allies, which Mr. Baker tells me have narrow leaves, are *Y. periculosa*, Baker, and *Y. circinata*, Baker, both of which, like the present species, have been referred usually to *baccata*, and which are yet imperfectly known.

Seedling plants have the blue-green leaves of *Treculeana*, and possess a cluster of rather fleshy fusiform roots becoming as thick as one's finger, but no central tap root. With age these roots are replaced by long, tough, cord-like roots as thick as a lead pencil. The trunks at length become a foot or two thick, and generally from ten to fifteen feet high, where my observations were made. Though

* Torrey, Bot. Mex. Bound. 221-2.

† Personal Narrative, ii. 490.

commonly unbranched or with only a double crown, they sometimes develop several large, more or less spreading branches. The very concave leaves are of a clear green color, and either entirely smooth to the touch or only slightly scabrous on the few angles which sometimes run longitudinally on the back. Their margin on unfolding is entire, purplish brown, and dilates into the firm but blunt brown tip, from which, after the leaves have expanded, it breaks away in the form of numerous stout gray or brownish fibers, pectinately spreading near the apex, and becoming longer and more remote below, so that ultimately the leaves are not filiferous except for a few crowded short fibers immediately below the point, and a more or less abundant aggregation of loose threads between their bases, causing a cobwebby appearance. The older leaves for a long time are reflexed against the trunk, and appear to be more fibrous and rigid than those of *Schottii* and *baccata*. The inflorescence is ample, recalling that of *Treculeana*, and the conspicuous white bracts sometimes measure as much as 3×12 inches.

In the Texan region indicated, this form grows with *Yucca elata*, *baccata* being absent; but it blooms a full month earlier than the associated species. Its fruit, like that of several of the other baccate species, is usually long beaked, and the seeds are tunneled in the manner characteristic of the work of Pronuba, the pulp being perforated by the escaped larvæ. I was unable to study this species in bloom, but large fruits gathered some three weeks after fertilization show none of the constrictions or indentations which so commonly mark the ovipositing punctures of the Pronuba moths, which leads to a suspicion that the eggs may be deposited in the upper part near the stigma.

Y. VALIDA, Brandegee. — In admitting this species to the list of Yuccas published in the Third Report, I had overlooked the fact that Mr. Brandegee* himself has referred

* Proc. Calif. Acad. (2), iii. 175.

it to *baccata*. The smooth leaves of the specimens I have seen are, however, quite unlike the rough foliage of the usual northern form of *baccata*, and the question of the distinctness of *valida* may still be kept open. I think it very probable that it will be found in the heart of Mexico, where several little-studied Yuccas of the *baccata* set occur, as well as in its present range on the peninsula of Lower California. Nothing is known of its pollination.

Y. FILIFERA, Chab. — Nothing is known of the pollination of this Mexican tree Yucca, except that herbarium specimens of its fruit show the work of Pronuba larvæ, from which Professor Riley infers that a large and interesting species of moth peculiar to it will be discovered.*

B. CLISTOYUCCA, *with leathery or spongy indehiscent fruits.*

Y. BREVIFOLIA, Engelm. (Pl. 6-9, 21)†.—This, our largest tree Yucca, is interesting from several points of view. Seedlings possess decidedly glaucous flexible leaves, rather similar to those of young *Whipplei*. At first a fleshy round-pointed caudex develops below ground, from which long simple tough roots spread in all directions; but this original descending axis disappears with age, so that the old tree has a flat or irregular basal disk, from which the tough roots, now as thick as a lead pencil, run into the soil for a long distance. As a rule each plant forms only a single trunk, but occasionally laterals develop, generally as a result of injury to the main stem. Until it is eight or ten feet high, the trunk is unbranched, and covered throughout with the very rough and rigid, mostly yellowish-green leaves, the lower of which are reflexed. When of about this size, it blooms for the first time (Pl. 6), after

* *l. c.* 121; Proc. Biol. Soc. Washn., vii. 96; Insect Life, iv. 371. As a further reference to this species should be given Fenzi: Boll. Soc. Tosc. ortic. xiv. 1889, 278, with plate.

† See an article by Shinn, on "The Land of the Tree Yuccas," in American Agriculturist, 1891, 689.

which two or three stout branches usually develop by the side of the original apex, which now has ended its growth. When these have reached a length of two or three feet each forms a terminal inflorescence, and branches in its turn, in this way giving rise to a repeated forking or tripartition. On an overturned trunk, however, several of the stronger branches usually become erect and grow to a height equal to that of young trees, before blooming and branching (Pl. 8), but so far as I have seen they do this without forming roots of their own, their supply of food and moisture coming through the persistent roots of the main trunk.* On the large stems, and even on some of the larger branches of old trees, the reflexed leaves gradually fall away, and expose to view a very thick gray bark, deeply fissured into quadrangles measuring about 1×2 inches. As the trunks increase in height they also become much thicker, the loosely fibrous, water-soaked wood being marked in concentric rings, resembling those of Dicotyledons and Conifers.† At the base, these older trees dilate quite abruptly, from the development of a circle of thick confluent roots, which correspond to those so commonly seen in the form of more or less marked prolongations of ridges and buttresses on Dicotyledons, and constitute the root-bearing disk mentioned above (Pl. 9). These large roots possess a structure superficially similar to that of the trunk.

When preparing to flower, this is one of the most attractive of all the Yuccas, the ovoid inflorescence buds, each as large as an ostrich egg, being closely invested by large thick white bracts, after the manner of a banana inflorescence; but the bracts soon become dry and crumbling, and the expanded cluster, though of very compact

* An excellent wood cut showing this habit of growth occurs in the Gray Herbarium, evidently clipped from one of the English horticultural journals, but I have been unable to obtain a more exact reference to it.

† The structure and mode of thickening in arborescent Liliaceæ is very fully treated by Röseler in Pringsheim's Jahrb. f. wiss. Bot. 1889, xx. 292–348, with several plates.

habit, is of an inconspicuous greenish white, and possesses an odor which is so oppressive as to render the flowers intolerable in a room, although the usual designation of fetid is not strictly accurate.* Though the flowers differ somewhat from the common Yucca form, they are quite as variable as those of other species of the genus, and range from globose to nearly oblong, or even prismatically pyriform when first opening. The petals differ from those of other species in being very thick, sometimes measuring as much as a quarter of an inch, and correspondingly rigid, and on different plants they vary from glabrous to very pubescent, and from glossy to quite dull, but usually with the waxen appearance so commonly seen in the genus.

The filaments here are generally much shorter than the pistil, against which they are very closely applied except near the top, where they are often clavately thickened, and the lower part is usually villous papillate. The pale lemon yellow anthers differ strikingly from those of eastern species, and in degree from those of other Californian Yuccas, in dehiscing only some forty-eight hours after the flower has opened, while the stigma appears to be fully receptive at the time of first expansion.

The whitish-green almost conical pistil is destitute of a clearly marked style such as *baccata* and *filamentosa* show, but its upper part is not occupied by the ovarian cells, and so is virtually stylar. The lobing between the carpels at top is so slight that the stigma is almost equally 6-notched. The stylar canal is rather ample above, but its connection with the ovarian chambers is through a series of slits, rather than open pores, and, at least after pollination, the passages are often occluded by the conducting tissue. The septal nectar glands are less developed in this species than in any other which I have studied. They are always narrow, and in some cases do not reach below the upper third

* *Cf.* Parry, Amer. Naturalist, i. 141; abst. in Gardeners' Chronicle, n. s. iii. 492.

of the ovary. Externally they open in the usual manner, but the deep outer septal grooves are little if at all expanded into a conducting channel, though they reach to the base of the pistil in the usual manner and expand there into triangular spaces. I have not observed any evidence that the septal glands secrete at all, nor is the stigmatic secretion as abundant here as in most species.

The dark colored *Pronuba synthetica*, which Professor Riley * describes as peculiar to this Yucca, rests during the day within the flowers in much the position already described for the eastern *P. yuccasella*, or, especially when disturbed, retires between the densely crowded flowers, where it is protected from most dangers; but it is more active through the day than its eastern congener. Towards evening the moths become quite active, and it is probable that copulation of the sexes occurs before night, for I have not seen male moths at night within the flowers where the females were occupied in oviposition. There is also reason to believe that the latter accumulate their loads of pollen at an early hour, though this again is only inference, since I have not witnessed the operation, even in the cases in which I have suspected that a moth was so employed, owing to the peculiarly closed condition of the flowers. Unlike the other known species, this Pronuba appears slow to take flight. Though it is easily disturbed, so as to run about and seek concealment between the flowers, I have seen it take to the wing only a few times, and then it merely sailed down to the ground, not far from the tree. This apparent indisposition to leave the flowers may, perhaps, be connected with the almost constant occurrence of high winds on the desert. Whatever its cause, this habit of the moths appears to restrict cross-pollination to flowers of the same plant more closely than is the case with other Yuccas, though there must be frequent flights from plant to plant

* *l. c.* 121, 141; Proc. Biol. Soc. Washington, vii. 94; Insect Life, iv. 370. (This was first called *P. paradoxa*, but without description.— Riley Proc. Wash. Ent. Soc. 1888, i. 154, and Insect Life, i. 372.

in quiet weather, and especially at night, when the wind sometimes falls; and the development of the stigma two days in advance of the stamens of a given flower, renders close fertilization in the strictest sense improbable.

The light yellow pollen is in such marked contrast with the smoky tint of the moth, that laden females are recognizable from a considerable distance, and notwithstanding the failure of direct observation, there is every reason to believe that the latter collect their burden from the older flowers with the same deliberateness that has been observed in the other known species of Pronuba, since it is held under the well developed tentacles in the same manner as by them.

On first examining the flower clusters of *brevifolia*, I was impressed by the remarkable symmetry of most of the fertilized pistils, some of which had already reached half the size of the mature fruit, which is in marked contrast with the constriction or indentation of the eastern capsular Yuccas at the point where the ovary has been punctured in oviposition. This absence of deformity was explained, however, when the act of oviposition was witnessed, for the moth pierces, in this species, the uppermost part of the style, conveying its eggs down to the ovary through the stylar channel,— the course followed by the pollen tubes.

The female of most species of Pronuba seeks for a fresh flower in which to deposit her eggs, showing preference for one in the first night of expansion. To this she is probably impelled by the impulse to insure for her offspring a sufficient supply of food, the younger flowers being less likely than the older to be already overstocked with eggs. This instinct is particularly marked in *P. synthetica*, which I have never seen ovipositing in any but the youngest flowers, while I have repeatedly seen the pollen-laden moths force themselves into the very narrow clefts between the rigid sepals of an opening bud, their flattened form facilitating this, after which only the most fragmentary glimpses of their work were possible. But during something over a

week in the early part of April, spent at Hesperia, California, where *brevifolia* is very abundant, I was fortunate enough to observe many of the moths at work in somewhat more open flowers, where their operations could be observed in detail by the use of a bull's-eye lantern, to which they show about the same tolerance as the other species.

When about to deposit an egg, having selected a suitable flower, the female of *synthetica* runs to the bottom of the stamens much as *yuccasella* does, makes a rapid more or less complete circuit of their bases, and then quickly ascends to the very top of the pistil, her thorax rather higher than the end of the stigma, and with her short but strong ovipositor cuts through the thin wall, into the stylar channel, rarely as much as 2 mm. below the tip of the stigma, meantime holding fast to the pistil, the stamens being below her reach. The long extensile oviduct is then passed through the puncture, the egg being laid apparently within the ovarian cell, along the funicular end of the ovules. In removing the oviduct the moth not infrequently carries her body across the stigma, so that at first sight she appears to be withdrawing it directly from the mouth of the stylar canal; but I have never seen her make direct use of this canal. The operation consumes more time than does the oviposition of either *yuccasella* or *maculata* as I have observed them, and usually takes altogether from two-and-a-half to three minutes. Sometimes two or more eggs are laid before the stigma is pollinated, but commonly after laying each egg the moth retreats to the bottom of the flower and then again ascends the pistil until her head is brought even with the stigma, when she uncoils the large tentacles from their resting-place against her load of pollen and passes them back and forth in the stigmatic chamber, with almost the same motion as the eastern species, usually making use of one of the stigmatic notches. While so employed she carries the rather short tongue almost straight out above the stigma, but I have never seen her make any use of it to force pollen into the latter, nor has she been

observed to attempt to feed on the slight stigmatic secretion nor to search for food at the base of the flower, where, if anywhere, the nectar of the septal glands should be found.

In this Yucca, the short spreading pedicels do not become erect after the fertilization of the flowers, as is the case in the capsular species, nor do they become markedly pendent as in *gloriosa* and all of the baccate species, but they maintain their original direction during the ripening of the fruit. As in all of the Yuccas, the maturing fruit develops a rather firm but thin core-like endocarp immediately surrounding the seeds, but in this species the thick exocarp, instead of becoming pulpy as in the baccate species, or hard as in the dehiscent capsular section, assumes a spongy texture. The ripe fruit, readily breaking from the tree, consequently possesses large bulk and low specific gravity.

Y. GLORIOSA, L. — Professor Riley* states that this species, which occurs in the *aloifolia* region of the southeast, is pollinated by *Pronuba yuccasella* when it chances to bloom in the season of the moth, which appears when the earlier forms of *Y. filamentosa* are in flower; but its blooming is more commonly later, often autumnal, so that it less frequently produces fruit than *aloifolia*, and Dr. Mellichamp writes me that although he has seen many blooming plants he never has seen fruit of *gloriosa* but once, and that was from a summer inflorescence. Like *aloifolia*, the present species, in some of its rather numerous forms, is said to fruit occasionally when Pronuba does not occur to pollinate it.† Engelmann has shown, how-

* *l. c.* 116, 117.

† Ellacombe, in the Gardeners' Chronicle for 1880, xiii. p. 21, reports that in England he has more than once had well formed fruit on *Y. recurvifolia*, but the seeds did not come to maturity; and in the same journal for 1885, xxiv. p. 628, he mentions what appears to be the same form, under the name of *Y. recurva*, as having fruited in 1876, some of the fruits and seeds having been sent to Kew and to Dr. Engelmann, a few abortive fruits, which soon fell off, having also appeared in 1885. On

ever, that forms of *aloifolia* have been cultivated frequently under the name of *gloriosa* or wrongly referred to that species,* and an editorial mention in the American Agriculturist for 1872, xxxi. p. 461, of the apparent absence of insects from the pulpy fruits "as soft as a banana" of *gloriosa*, in Georgia, undoubtedly refers to *aloifolia*. Professor Riley limits the power of self-fertilization so far as known to *aloifolia*;† and it may be questioned whether the French *gloriosa* seedlings mentioned by him in a quotation from The Garden‡ were not really *aloifolia*, though it is not distinctly stated that they were not the result of artificial pollination. I have no personal knowledge of the fruiting of true *gloriosa* except in the case figured on plate 7 of the Third Garden Report, where a specimen cultivated in Washington produced fruit side by side with a plant of *aloifolia*, and in this case the fruits were more or less deformed, as if by Pronuba.

A rather narrow-leaved form of this species, cultivated in the Garden under the name of *Y. nivea*, bloomed in the early part of September, 1892, and showed nearly as great activity of the septal glands as the specimen of *Guatemalensis* already described, the nectar appearing in considerable drops within the bottom of the perianth, about the almost pilose bases of the filaments. While the *aloifolia* of the Garden was fruitful without the aid of Pronuba or hand pollination, and both *aloifolia* and *Guatemalensis* yielded fruit when artificially pollinated, this plant set no fruit, though a number of flowers were pollinated by Mr. Webber. It will be of interest, therefore, to have observations made on *gloriosa*, whether wild or cultivated in its native region. The later blooming of this species,

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the other hand in a popular account of Yucca pollination, in his Pflanzenleben, ii. 155, Kerner von Marilaun states that the fruit of this species is quite unknown both on wild and cultivated plants, and it is said that the moth adapted to *gloriosa* has become extinct.

* Trans. St. Louis Academy, iii. 211; Collected Writings, 297–8.

† Proc. Amer. Assoc. Adv. Sci. xxxi. 467.

‡ Proc. Amer. Ass. Adv. Sci. xxix. 624.

like that of certain forms of *filamentosa*, involving, as it appears to do, a loss of the services of Pronuba and consequent sterility in all but exceptional cases of early blooming, is especially worthy of study, considering the usual close correspondence of the period of blooming of the Yuccas with that of the appearance in the perfect form of their Pronubas.

C. CHÆNOYUCCA, *with dry, septicidally dehiscent capsules.*

Y. RUPICOLA, Scheele. — No observations have been recorded on the pollination of this Texan species, which Professor Riley* believes may have a distinct Pronuba. It is not uncommon from Fort Worth southward, on the black soil with intermingled limestone, but I failed to study wild plants. At Dallas, however, through the kindness of Mr. J. Reverchon, I was able to examine specimens cultivated on his place, which were blooming simultaneously with the wild *Y. glauca*, var. *stricta* and frequented by *Pronuba yuccasella* like the latter. These plants are abundantly fertile (each crown dying after blooming), and the structure of the flower indicates that the moth works on them as she does on the *filamentosa* group, though I was unable to observe her actions. Their seedlings are now spontaneous about the place, and so variable that Mr. Reverchon suspects hybridization with the native variety of *glauca*, as well as cultivated forms of *filamentosa*. This will prove an interesting subject for future study, since the habits of Pronuba in caring for her young are so highly specialized, and the details are so minutely carried out, that it was hardly to be expected that a given individual would indiscriminately pass from one species of Yucca to another, though on the other hand, it is known that the more eastern species are all pollinated by representatives of the single species of Pronuba.

Y. ELATA, Engelm. (Pl. 10, 15, 22).— Beginning in western Texas, about the limits of *glauca*, this Yucca gradually

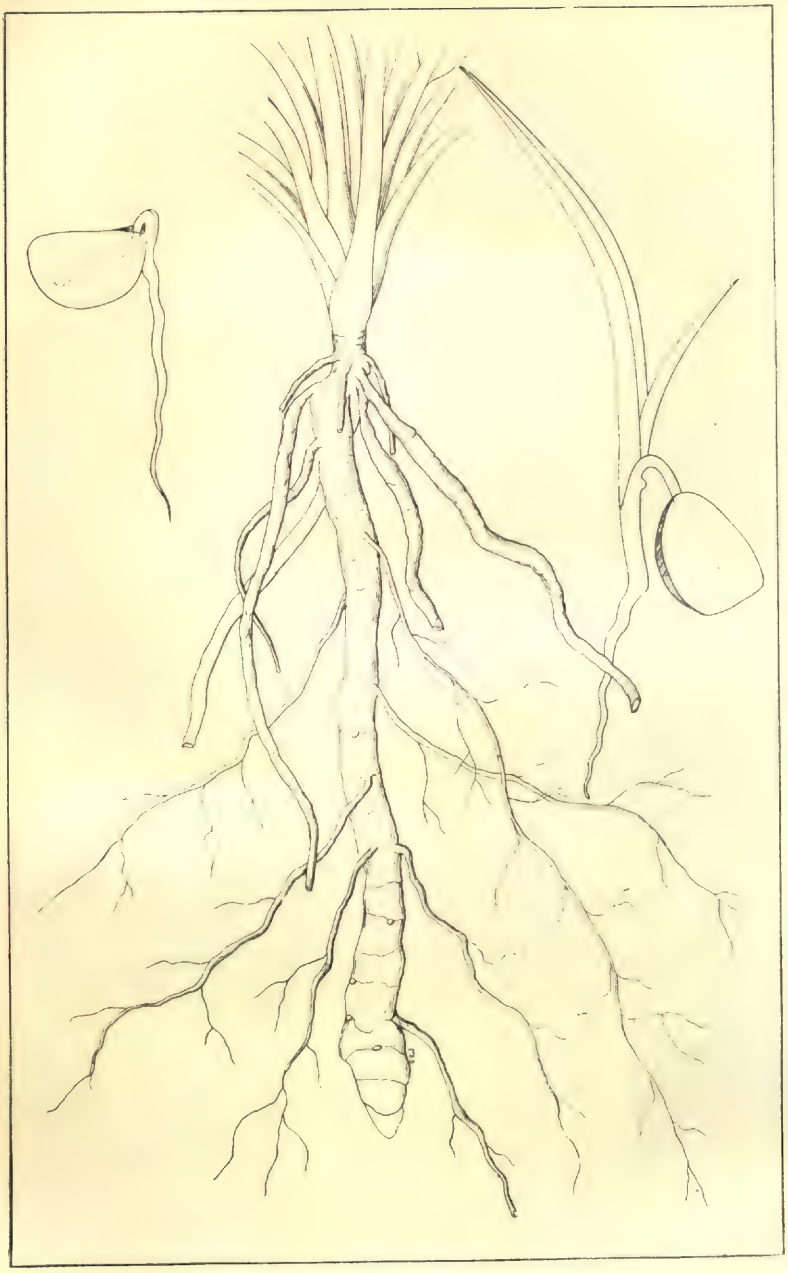
* *l. c.* 122.

increases in size as one passes into Arizona, where it becomes a rather large tree, but of far simpler habit than *brevifolia*, and much smaller than the larger plants of that species. Its underground axis is of the *glauca* type, — long, tough and branched,*— so that it is difficult to remove even the very small plants from the ground. The inflorescence appears to be terminal, so that the crown which has bloomed has its apical growth destroyed; but a lateral bud develops into a new crown, and in time a number of thick new heads may form in this manner, making a pluricapitate plant. The shortness of these branches, and their dense covering of long spreading leaves, contrasted with the frequent slendernesss of the trunk, after its lower leaves have become reflexed and dry, gives the tree a peculiar and not ungraceful appearance, quite different from that of any other species native of the United States. The old flower stalks, when above the reach of cattle, usually hold their dehiscent capsules for at least a year, and at length break away without disarticulation above the base, which persists for years along the side of the stem, closely applied to it because of the erect sympodial habit of the latter.

At Eagle Flat, Texas, I was able to spend several evenings about the first of June in studying the pollination of this species, which there rarely becomes six feet high and begins to bloom when not more than two feet high, so that observations are more readily made than on the taller plants of southern Arizona.

The flowers are nearly pure white, with quite acute thin petals, and conform in most respects to those of *glauca*. The style, however, is white, as in *rupicola* and *filamentosa*, and its segments are little thickened dorsally. The septal nectar glands are very well developed, as in all of this group, and reach to the base of the ovary. They appear to be slightly more active than in related species, for a little nectar was recognized in several flowers, and two

* Engelmann, Coll. Writings, 279, 280.



YUCCA ELATA AND FILAMENTOSA.

species of small bees* were taken, probing the outlets of the conducting grooves at the base of the pistil; but these insects were not seen to visit the stigma, so that they play no part in pollination. Considerable numbers of a moth, which Professor Riley determines for me as *Acontia Arizonæ*, Hy. Edw., were seen resting in the flowers during the day, and settled about them, especially on the pedicels near the base of the perianth, at night, but I was not fortunate enough to determine the occasion of their visits to the plant, though I suspected that their larvæ might develop on it. So far as can be seen, they play absolutely no part in its pollination, though it may be that they feed to a greater or less extent on the nectar. The stamens shed their pollen promptly on the opening of the flowers, and this is devoured by various small flies with the same avidity as in *glauca*, and with about the same prospect of effecting occasional casual pollination as in that species.†

Like the eastern Yuccas, *elata* is pollinated by *Pronuba yuccasella*, the work of which was repeatedly observed in detail at Eagle Flat, where the moths were abundant. During the day, like the Eastern moths and those of *baccata*, they rest in the flowers with their heads directed to the base of the petals. Shortly before sunset many of them become active (as is the case on *filamentosa* at St. Louis), the females beginning their work of oviposition and pollination, while the males run and fly actively from flower to flower in search of their mates; and this is continued through the greater part of the night.

When about to deposit an egg, the moth here, as on *filamentosa*, runs nervously about within the bottom of the flower, then scrambles to the top of the pistil and backs down between two stamens by a succession of jerks until her head is about level with the base of the style. Holding to the pistil by the pro- and meso-thoracic legs, the last

* Determined by Mr. Charles Robertson as *Agapostemon Texanus*, ♂, and *Halictus albipennis*, ♀.

† See a note by the writer in Riley, *l. c.* 125.

pair not infrequently carried out over the filaments, she then punctures the ovary and the egg is consigned to its place in the manner so well described by Riley for *filamentosa;* but as a rule the operation appears to consume rather less time on *elata* than on the other Yuccas I have studied. Usually each oviposition is followed by pollination, in which, so far as I can see, the moth acts precisely as on *filamentosa;* but in a few cases two eggs were laid before pollen was carried to the stigma, and under the bright light of the lantern the actions of the moth are sometimes so disturbed that she will leave a flower after ovipositing, without subsequently pollinating it. I have also observed on this species that she sometimes interrupts the act of pollination to coil the tentacles against her load of pollen, after which they are again inserted in the stigma, thus securing for the latter a larger amount of pollen; but I have no doubt this procedure is as common on the other species pollinated by *yuccasella*. In one instance, a moth disturbed by the light while ovipositing left the flower without pollinating it, but her first act on going into another flower was to thrust her pollen-laden tentacles into the stigma, though it appears to be unusual for this to precede oviposition.

The collection of pollen from the anthers was not closely observed on *elata*, but on several occasions the moth, when disturbed in oviposition, ran upon a stamen, shaking it quite violently and making several passes at the anther with her tentacles, as if impelled by fright to discontinue one of her customary occupations only to engage in another,—though her motions were too quick and nervous for me to see that she actually gathered any pollen. There is, however, no reason to doubt that the collection of pollen is similar to that on *filamentosa*, where, however, it is by no means always slow and easy of detailed observation.

When I passed over the Texas and Pacific road again, about a month later, a fair crop of partly grown fruits was seen, the usual constriction or indentation being noticeable over the Pronuba punctures. At Benson, in southern

Arizona, where *elata* assumes much larger proportions, though it bloomed very freely this year, I did not succeed in finding any of the moths in a day-light search in the early part of June, just as the species was coming into bloom, nor were many ripening capsules to be found when I again visited this locality toward the end of the month. But the few fruits which had set showed the usual Pronuba deformity, and a considerable number of last year's capsules were found, all containing the remains of tunneled seeds, and perforated by the escaped larvæ.

Y. GLAUCA, Fraser, Cat. 1813, not Sims. (*Y. angustifolia*, Pursh, 1814, and most recent writers).*— It has long been known that the pollinator of this representative Rocky Mountain species is *Pronuba yuccasella*, which appears coetaneously with its flowers in the west and southwest, but, being more closely connected in the east with the later-blooming *filamentosa*, only exceptionally appears early enough to pollinate even the latest blooming flowers of *glauca* on plants cultivated in Washington and St. Louis † (where a few capsules were again matured in the summer of 1891). The only observations on the behavior of the moth on wild plants that I know of are those reported by the writer in 1891 from the vicinity of Manitou, Col.‡ Incomplete as these are, they show that her actions are quite the same as on *filamentosa*.§

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* Though for reasons of expediency it would be better to preserve for this plant the name of *angustifolia*, under which it is universally known, the short description in Fraser's Catalogue is sufficiently characteristic, in connection with the northern locality from which his specimens were obtained, to make it necessary to restore his name. The later *Y. glauca*, Sims, is an entire-leaved plant which I should refer to *filamentosa*.

† Riley, *l. c.* 116, 121, 128. ‡ See Riley, *l. c.* 124.

§ The principal references under this species are as follows: Bruner, Entomol. Bull. U. S. Dept. Agriculture, ii. 9. Meehan, Bull. Torrey Bot. Club, iv. 63; Proc. Phila. Acad. 1873, 414; Proc. Amer. Ass. Adv. Sci. xxx. 205; Amer. Nat. 1881, 807; Proc. Phila. Acad. 1888, 275, general abstracts in Proc. Amer. Ass. xxxvii. 284 and Bot. Gaz. 1888, 237. Riley, Trans. St. Louis Acad. iii. 570; Mo. Ent. Rept. v. 159; Insect Life, i. 368; Rept. Mo. Bot. Gard. iii. various places.

The typical *Yucca glauca*, as represented in Colorado and Kansas, spreads below ground by a series of rather slender but very strong axes, and in its more highly developed form has a more or less developed mostly prostrate stoutish trunk above ground. So far as I know, whether caulescent or acaulescent, a given axis usually blooms repeatedly.

Y. GLAUCA, var. STRICTA, (Sims.). (*Y. angustifolia*, var. *mollis*, Engelm.) (Pl. 22).— In its broader flaccid leaves, occasionally an inch wide, this forms an approach from *glauca* to the Eastern *filamentosa*, but its range, — Arkansas, Louisiana and Texas,— brings it strictly within the region of the former and its immediate allies. Unlike the more representative *glauca*, however, a given crown seems more likely to fruit but once, though the subterranean parts are similar in both. Its delicate greenish-white flowers, most commonly in a simple raceme, possess the general characters of those of the type, and are slightly fragrant. The styles, though somewhat variable in color, are commonly bright green as in the type, so that they contrast with the ovary, which is colored similarly to the perianth. The stylar canal is open and in evident communication with the cells of the ovary, and at times contains a plentiful secretion. No nectar was observed at Dallas, Texas, where I had an opportunity of examining the flowers in several localities, but the septal glands are large and with large conducting grooves, as is generally the case in the *filamentosa* group.

Many years ago Boll * made a number of observations about Dallas on the Yuccas, some of which were doubtless of this variety. While he did not at first discriminate between Pronuba and the related *Prodoxus decipiens*, — which Professor Riley has well called the Bogus Yucca Moth, — and especially the still more deceiving *Prodoxus intermedius*,

* Boll, Stettin. Entomolog. Zeitung, 1876, 401, quoted by Riley in Trans. St. Louis Academy, iii. 571.

and fell into some other serious errors, he appears to have been the first to observe the collection of pollen by the female Pronuba, though not with the detail given by Professor Riley in the account of his own observation of this operation on Y. *filamentosa*.*

The pollinator of this variety, as of the more representative form of the species, is the white *Pronuba yuccasella*. As on other Yuccas, the moth is quite sluggish within the flowers during the day, apparently considering itself concealed by its protective coloration. Numerous laden females were taken and observed about the flowers at night, and copulation within the flower was several times seen in the evening, but I was unfortunately not able to see these moths engaged in either pollination or oviposition. The pale pollen, however, is very evident in the green stigmas, where there is little reason to doubt they have placed it. Egg punctures were also observed in numbers, in such a situation on the ovary as to show that the moth occupies the same position when ovipositing as on *filamentosa*. On the older panicles a fair percentage of fruit was maturing at the time of my examination at Dallas, and showed the usual Pronuba constrictions, and several capsules of the preceding year which were found had been perforated by escaping larvæ, and contained remnants of tunneled seeds.

At Putnam, Texas, considerably west of Dallas, a larger form of what I take to be this variety of *glauca* occurs, with narrower leaves; and about the end of May this was passing out of bloom, just as *elata*, still further west, was beginning to flower. At this place, fewer capsules had set than about Dallas, but these showed the irregularities indicative of oviposition by Pronuba, which had quite disappeared; and some of the stalks of the preceding year still bore capsules which were marked by the escape perforations of her larvæ.

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* Proc. Amer. Assoc. Adv. Science, 1882, xxxi. 467–8; Third Garden Report, 106, pl. 38, f. 2.

Y. FILAMENTOSA, L. (Pl. 11, 22). — This species is the subject of nearly all of the pollination observations heretofore published, and its interrelations with *Pronuba yuccasella* are so well known that I need scarcely do more than refer to Professor Riley's account in the last Garden Report. In St. Louis the observations of preceding years * have been repeated by myself and others, and on several occasions the collection of pollen was again witnessed, but in the same imperfect manner as last year, owing to the haste of the moth. Although special attention has been given to this point I have failed to see the moth attempt to feed on either the stigmatic secretion or the septal nectar, nor have I been able to reconvince myself that she makes use of the tongue in pollination, as I once thought. As in the case of *Yucca elata*, the moth, when disturbed by the lantern while ovipositing, sometimes attacks the stamens, as if intending to reinforce her load of pollen, but in most cases without proceeding far in this before retreating to the resting position within the base of the flower, or leaving the latter. In addition to the insects heretofore seen in the flowers of this species, I have this year seen several specimens of a rather large flower beetle, *Trichius piger*, in the bottom of the flowers, with their heads at the outlet of the nectar grooves as if feeding on the small amount of secretion.

HESPEROYUCCA.

Filaments adnate to the petals below: pollen agglutinated in coherent masses: style slender: stigma capitate, hyaline-papillate, with a microscopic axile canal: fruit capsular, loculicidal.

Y. WHIPPLEI, (Torr.) Baker. (Pl. 16, 23).— From the San Bernardino Mountains north to the latitude of Monterey and south into Lower California in the Coast Range, this peculiar species is very abundant, especially

* See Riley, *l. c.* 123 etc. Ellacombe in the Gardeners' Chronicle for 1872, p. 1457, Morse, *ibid.* 1885, xxiv. 598, and Smith, *ibid.* 1872, 1391, report spontaneous capsules on this species in England. This should be compared with the references given under *gloriosa*.

HESPEROYUCCA WHIPPLEI.

through the Tehachapi region, the lower mountains being often densely covered with its large frequently cylindrical panicles or old fruit stalks. The most typical form, as it occurs in the Cajon, Tehachapi, and San Luis Obispo regions, is almost always cespitose, sometimes with eight or ten crowns clustered over a single root, owing to the formation of lateral branches near the base of the main stem, even while this is quite young. After blooming, a given crown dies, but the several heads of these cespitose plants may prolong the life of the plant through a series of years, until the last of them has flowered. The leaves of this form are commonly, though not always, quite rigid.

The flowers are as variable as in the true Yuccas, ranging from globose to bell-shaped, and there are great individual differences in the degree to which they expand, but they are not typically rotate, as Dr. Engelmann was led to believe by some photographs looking directly into rather widely opened flowers. They differ from those of other species in having the glabrous (but still minutely granulated) filaments attached to the lower part of the petals,—a character not well shown in the figures in the last Report, so that as they open the stamens are drawn away from the ovary instead of lying in close apposition to it. The small oval anther cells are commonly tipped by a bunch of white hairs, though in specimens observed on the mountain sides above San Luis Obispo these were reduced to one or two on each cell or were apparently entirely wanting, and I have no idea as to their function. On dehiscing, the cells contract in such a manner as to expose the pollen freely, but at the same time prevent it in most instances from falling out, as it so frequently does in the true Yuccas. As Riley has already shown,* the pollen of this plant is not loose and powdery, as in Yucca proper, but glutinous. The contents of each anther cell, in fact, form a rather consistent two-lobed moist mass, which is held by its lower part but protrudes prominently from the open anther.

* *l. c.* 126, 139.

The pistil differs materially from that of the true Yuccas in having the ovary free from those longitudinal depressions which usually correspond with the appressed stamens, and in possessing a short contracted style surmounted by a capitate stigma, green toward the center, where it appears slightly indented, and covered with very long hyaline delicate papillæ which are always moist with abundant secretion that at length becomes almost gelatinous over the middle of the stigma. From the central depression of the stigma, a fine but unobstructed canal passes down the style and communicates with the top of the cells of the ovary. The nectar apparatus is well developed, the septal glands, though narrow, commonly reaching to the base of the ovary, while the conducting groove is of corresponding size. My observations lead to the conclusion that the glands, though smaller than in the *filamentosa* group, are more active than in other species studied by me, with the possible exception of *gloriosa* and *Guatemalensis*, for I have repeatedly seen considerable drops of nectar at the basal outlets of the grooves, especially in the early morning or in damp foggy weather when evaporation was slow, and in pendent flowers similar drops have been seen several times over the grooves at either the middle or top of the ovary, along the smooth surface of which they had apparently rolled from the outlets of the conducting grooves.

Professor Riley has shown that *Whipplei* is pollinated by a distinct Pronuba, which he names *P. maculata*, of a white general color, but somewhat variously mottled with black, especially towards the ends of the wings.* He records the occurrence of the moth in the vicinity of San Diego, Los Angeles, Newhall, and Caliente. I have also taken specimens at Summit in the Cajon Pass, at Saugus, San Luis Obispo, and along the Santa Ynez river above Santa Barbara, besides seeing evidence of its work in the

* *l. c.* 121, 139; Insect Life, iv. 370, note. For other notes by the same author, see Proc. Ent. Soc. Washington, 1888, i. 154, and Insect Life, i. 372.

old fruits both at Newhall and Caliente. The only other insects observed by me in the flowers, were small flies and beetles similar to those so frequently seen in the flowers of the Yuccas, a few small bees, and on one occasion, hive bees. The latter were primarily attracted by an abundant watery fluid on the outside of the flowers, of undiscovered origin,* and entered the flowers only incidentally. The others gathered nectar from the base of the corolla, where the nectar grooves open. Neither were seen to touch either the anthers or stigma, and it is doubtful if they carry pollen from one to the other, even by accident, which is the only way in which this could happen.

From its pronounced fragrance, which while it is of the general yucca type somewhat recalls that of the tuberose, its active nectar glands, pollen aggregated into crude pollinia, and large capitate stigma covered with long moist papillæ, *Whipplei* would appear quite likely to be pollinated by visitors other than Pronuba; and, as Professor Riley has well said, of all the Yuccas it would seem to be most easily self-fertilizable. In fact, in the lower part of the Cajon Pass when the species was in the best of its blooming period, very few Pronubas were seen; and, while there was a corresponding scarcity of setting fruit, a few plants were found with more or less abundant, partly developed but unusually diminutive capsules in which no oviposition scars could be detected, and some of the fruit of the preceding year was of the same dwarf character and without either escape holes or the masses of tunneled seeds almost invariably seen in old capsules elsewhere. Frequent observation has shown that the pollinia may be deposited on the margin of the stigma directly from the anthers in closing flowers, particularly the small ones to which these dwarf capsules correspond; and it was, therefore, with no little surprise that I noted, in contrast with this apparent power of self-fertilization, that with this single exception, no

* See note under *baccata* for the occurrence of a similar exudation in species of Yucca proper.

fruit whatever was found except that which clearly showed the work of Pronuba. At best, therefore, I should say that where its proper Pronuba is absent, *Whipplei* has only the limited power of self-pollination, or pollination by other agents, that is possessed by *aloifolia* among the true Yuccas. I have also no evidence that pollen tubes ever develop in such a manner as to reach and fertilize the ovules from pollinia placed on the margin of the stigma, although search was made for something of the sort; and a determination of the extent to which fertilization in this manner is possible must be made by a series of experiments such as I could not carry out in the time at my disposal.*

The characters of *Pronuba maculata* have been so fully given by Riley that nothing need be added to his description. From the frequently open character of the flowers, and, especially, the withdrawal of the stamens from the pistil, these moths are, however, constrained to behave quite differently from the other species of their genus; and very probably in connection with the more diurnal nature of the Hesperoyucca flowers, they are far more active in the day time than their congeners are. Unless locally absent, they are readily observed whenever the flowers are examined, either resting in them or engaged in pollination or oviposition, and at first sight it is difficult to say whether they are quiescent or engaged in the latter operation, for, unlike the other known Pronubas, they rest with the head toward the stigma, usually standing upon the side of the ovary, — a position almost identical with that taken in ovi-

* Since the above was written, Professor Riley, under date of October 13, 1892, writes me that in a manuscript report on the pollination of *Whipplei*, Mr. Coquillet of Los Angeles records the seeding this year of a number of pods or panicles which he had covered with gauze before any of the flowers opened. Professor Kerner von Marilaun (Pflanzenleben, ii. 155, figures 1 to 5), states that in repeated cases of blooming in the Vienna Garden this species has never matured its fruit. The figures which accompany his account of Yucca pollination represent some Euyucca, — apparently a form of *filamentosa*, — though they bear the name *Whipplei*; and the moth represented as pollinating the flower (adapted by the artist from Riley's figures), is *yuccasella*.

positing. While in this attitude they are very observant, and the approach of one's face, even at a distance, causes them to retire further down the pistil. When so disturbed they are also very apt to drop suddenly from the flower and take wing, seeking a new retreat.

I have not seen the collection of pollen by the typical form of this moth, but, from the way in which the load is carried, there is no doubt that it is accumulated in the manner presently to be described for the pollinator of what I take to be the *Yucca graminifolia* of Wood, and I see no reason to doubt that it frequently takes place in the bright daylight, as both oviposition and pollination do. Either of the latter operations may be witnessed at any time during the day, if the flowers are not approached too suddenly.

When the moth is about to deposit an egg, she usually moves about in the lower part of the flower much as the other species do, commonly dragging the tip of the ovipositor along the parts she walks on as if wiping off extruded secretion, but also seemingly using it as a tactile organ while she assumes the position best suited to oviposition, which is nearly the same as that taken while at rest. Standing on the side of the pistil, she then bends the abdomen sharply forward so as to bring the ovipositor to about the middle of the ovary, which she pierces at the thinnest part, namely, about 1 mm. from the septal groove. As a general thing not more than six eggs are laid in a given pistil,— one on either side of each septum,— and frequently the number is smaller than this, so that even if they all hatch, which is not likely to be the case, there is rarely more than one larva to each tier of seeds, and consequently a fair percentage of the seeds are allowed to come to maturity. In the very succulent white ovary the puncture made in laying an egg is usually seen easily immediately after the ovipositor is withdrawn, and a rather large drop of clear sap not infrequently exudes from it within a short time.

Having withdrawn the oviduct, in doing which she moves up so that her head is about level with the stigma, or even before this organ is entirely freed, the moth usually proceeds to pollination; but it is not infrequent for two eggs to be laid between each two visits to the stigma, and, owing to her peculiar alertness, she appears to be even more easily frightened into omitting pollination than are the other species of Pronuba. Standing with her head at about the height of the stigma, with the short tongue projecting out in front, she uncoils her long tentacles from the compact mass of pollinia, — which she carries similarly to the other Pronubas, — only that small part of her burden which adheres to the bases of the tentacles being removed from it, and, raising her body on tiptoe, she very slowly saws the tentacles back and forth across the top of the stigma, generally following one of the three shallow grooves, and very carefully working their slender tips into the more or less gummy exudation over the central depression. Sometimes the operation is interrupted long enough to admit of the tentacles being coiled back against the load of pollen and again extended; but the curious manner in which her head is held back from the stigma as a rule prevents any of the main load from reaching even the marginal papillæ.

On first witnessing this operation, I was impressed by the much slower motion of the moth than usual, and the evident care which she took to run the ends of the tentacles into the central depression of the stigma, which I then supposed to be solid; the subsequent discovery of the stylar canal, communicating with the ovarian cells, showed that it is into this narrow passage that she so carefully guides the tips of her tentacles with their modicum of pollen, and no doubt the abundant stigmatic secretion serves not only to foster the development of the nascent pollen tubes after pollination, but, wetting the tentacles, aids in the disintegration of her mass of pollinia. These, if really related to her work, would seem to have acquired their coherent structure as a means of facilitating their collection, rather

HESPEROYUCCA WHIPPLEI, VAR. GRAMINIFOLIA.

than as an adaptation to their removal bodily from the anther to the stigma as is the case in orchids and asclepiads, where, however, special means of secure attachment to the insect accompany this aggregation of the pollen grains into a large mass.

As in the other capsular Yuccas, the pedicel of the fertilized flower soon becomes erect, and the ovary shortly begins to enlarge and assumes a bright green color. Owing to the injury inflicted in piercing its wall, the part immediately about the puncture does not take a very active part in this growth, and a cross section here shows a decided difference in size between the punctured and unpunctured half cells of the ovary, and, as the enlargement of the capsule continues, a decided pit appears, mostly of a darker green than the surrounding parts.

H. WHIPPLEI, var. GRAMINIFOLIA, (Wood). (Pl. 13, 23).—What I take to be this form, is the common Spanish Bayonet of San Bernardino, beginning near the foot-hills north of the city and extending up the smaller cañons and upon the mountain sides to an elevation of 1000 feet or more, and, in the Cajon Pass, reaching up toward Cajon Station, where the steep ascent of the pass begins. Recent notes from Dr. Yates, of Santa Barbara, show that a plant of the general character of this variety occurs in the mountains above that city, in addition to the typical *Whipplei;* and it appears to pass eastwards from the San Bernardino region, though I am not in possession of detailed information as to its distribution outside of the limited area between San Bernardino and the foot-hills north of that city. The plants are very abundant around the Arrowhead Springs, where the type of *Whipplei* does not occur, and I was able to make a rather careful study of them there shortly after the middle of April, when they were just coming into bloom, as well as a month later, when their flowering period was nearly past; and, still later, in company with Mr. S. B. Parish, I had an opportunity to drive over the principal part of the valley covered by this form, at a time when its

pollinator had almost completely disappeared, though some spikes were yet blooming.

In aspect, this variety differs from the typical *Whipplei* of the mountains in not being cespitose, and in its thinner, quite flexible, often broader and longer leaves. Its flowers are similar to those of the type except that they are commonly more or less brown-purple, and they are as variable in form. All about Arrowhead, at the time of my first visit, there were evidences of the work of a Pronuba in last year's capsules, which were very abundant, and I consequently expected to be able to study the work of *P. maculata* in the opening panicles. I was, however, surprised to see that the only Pronuba found on the plants of this vicinity, though possessing the usual *maculata* structure, was of a beautiful jet black color, and, with the exception of a single specimen, in which the thorax was dingy white, this proved to be the case with the thousands of moths seen or captured about Arrowhead and in the valley to a point near Irvington. I have called this melanic form *P. maculata*, var. *aterrima*.*

The females of this black Pronuba rest upon the ovary with their heads toward the stigma, precisely like the typical *maculata*, while the males also commonly stand upon the petals. Like the maculate moths, they are very alert, and quite ready to drop from the flower and take wing when disturbed. They are also active during the day, the males, especially, running and flying from flower to flower in quest of their mates; and copulation is seen within the flowers at all times of the day.

The collection of pollen was witnessed several times,

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* *Pronuba maculata*, var. *aterrima*, n. var. Characters of the species, but the chitinized parts smoky brown, and the scales of a dead black color throughout, or a few pale ones near the tips of the primaries.—Living as a larva in the forming seeds of *Hesperoyucca Whipplei*, var. *graminifolia*, the flowers of which are pollinated by the female imago. In the foothills immediately north of San Bernardino, California, April, 1892. Types deposited in the Entomological collections of the National Museum, the Agassiz Museum and the California Academy.

under a cloudless sky, the first time at about noon. Flying into a flower, the moth runs about the bases of the stamens after the manner of other species, then quickly clambers upon the inner side of a filament, and, with the tentacles extended over the pollinia, drags first one and then the other out of the anther cells, pressing them together under the throat, and subsequently compacting the mass together much as *yuccasella* does the powdery pollen of other Yuccas, so that the ball finally consists of as many as ten or a dozen pollinia. So quick and energetic are the motions by which the pollinia are removed, that the stamens are often shaken quite violently, as I have before noted in the more nervous attempts of *yuccasella*. Oviposition and pollination, which were repeatedly witnessed, are performed exactly as by the maculate moth, the very slow movement in the latter operation being quite as striking.

The relationship of the Yuccas to one another and to their pollinators, the Pronuba moths, would be far more intelligible if we could trace their history back even a short distance into the later geological time, because as Yuccas and Pronubas both are undoubtedly of recent origin; but as was pointed out in the Third Report of the Garden, this is as yet impossible, since no certainly identifiable Yuccas exist in even the latest deposits, though plants bearing more or less resemblance to them occur far back in the geological epoch. In his paper so frequently referred to in the foregoing pages, Professor Riley has called attention to the ancient type of vegetation represented by the tree Yuccas. This is particularly true of *Y. brevifolia*, which in aspect resembles restorations of the Carboniferous *Lepidodendron* more nearly than any other form of recent or fossil tree with which I am acquainted. The other arboreous Yuccas are more like the Dracænas in habit, but the latter also belong to an antiquated type.

Though no single species extends across the continent,

the Yuccas occur in practically unbroken continuity from the Atlantic coast in the vicinity of Fortress Monroe to Florida, and across the Southwest and Mexico to California in the neigborhood of Monterey, *Y. glauca* reaching well up on the upper Missouri River, and *Y. baccata* following the Rocky Mountains northwards into southern Colorado. From this it may be inferred that they have become specifically differentiated at a comparatively recent date, an inference which is supported by the fact that notwithstanding various dissemination contrivances which may be held to be of still later acquisition, all of the species except the distinctively West Coast *brevifolia* and *Whipplei* may be broadly classed under the same type. The occurrence of so many species of the same floral type, and of what may be called modern habit of growth, over a common geographical area in the southern part of the continent, while the apparently ancient *brevifolia* is restricted to the desert region in or adjacent to California, and the seemingly more highly differentiated Hesperoyuccas occur only in the mountains near the latter region, though each has its specific *Pronuba* quite different from the one associated with the Eastern Yuccas, would lead one to surmise that the geological record, if it had been preserved, would show that the first of the Yuccas were of wide distribution, probably extending across the continent on the higher parallels while the northern climate was less rigorous than it now is, but receding to the south under the advancing glacial cold. Indeed it seems reasonable to suppose that the ancient type as represented in *brevifolia*, with an equally ancient type of *Pronuba*, has persisted in the Pacific region throughout, perhaps owing to the series of circumstances which have led to the preservation of the *Sequoias* in the same region,* while the more widely distributed species became differentiated and, with their pollinator, passed to the south under new conditions.

* See Gray, Presidential Address, Dubuque meeting American Association for the Advancement of Science, —Proceedings, xxi. 1.

All of the Yuccas agree in the possession of a general liliaceous type of flower, and in having compound pistils with a stylar canal and septal nectar glands. The latter characters, however, pertain to a considerable group of Monocotyledons, and evidently antedate the evolution of the Liliaceæ as an order.* If my view is correct, each of these characters came to Yucca in a fairly advanced state of development, from an earlier type of monocotyledonous plants. In *brevifolia* or its immediate ancestors, as well as in the eastern Yuccas, the stylar canal appears to have been extended and amplified at top through the marginal union of erect stigmatic lobes, so as to form the peculiar stigmatic chamber into which the pollen must be thrust in order to properly develop its tubes and fertilize the ovules.

Originally having spreading stigmas, we may assume that the progenitors of the Yuccas were slightly specialized entomophilous flowers, pollinated by hymenoptera, diptera or lepidoptera, which were attracted by the secretion of the septal nectar glands. With the consolidation of the stigmas, however, insects visiting the flowers for this nectar became inefficient pollinators, as may be seen when such insects enter the flowers of the existing Yuccas for the little nectar still produced; hence, with an economic reduction of the secretion of these glands, may have come an addition of their function to that normally borne by the stigma, in an increase in its secretion, so that the visitors, laden with pollen unconsciously accumulated while in the flower, should further visit the stigma on which some of their burden might be rubbed while they were feeding. During this stage of its evolution the plant appears to have proved especially attractive to some small moth, perhaps

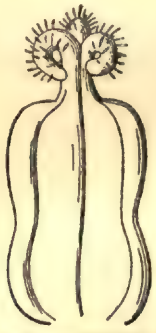
* For a stylar canal in *Agave* see Danielli, Studi sull' *Agave Americana*, Florence, 1885, 59, pl. 10; George and Wittmack, Gartenflora, 1892, 273, f. 55, but incomplete. References to the principal papers on septal nectar glands are given in a short note by myself in the Bulletin of the Torrey Botanical Club, 1886, 135.

fond of nectar, and with phytophagous larvæ, which is to be regarded as the progenitor of the Pronubas and their close relatives of the genus Prodoxus, the history of which has been so well summarized by Professor Riley in the Third Garden Report. Whether the first Prodoxids were also pollen feeders, so that their mouth parts became accidentally laden with pollen between their visits to the stigma in search of its secretion, I cannot surmise. As my friend Dr. Lind has suggested, they may have learned to collect this substance and deposit it in the stigma through an instinct such as prompts the mud-dauber to place its prey about the point where its eggs are laid, or the bee to deposit honey and pollen where it can be used by the larvæ, as though its young were to be directly nourished by the pollen. At present, however, the act appears to be strictly voluntary, without food compensation, and entirely connected with the fertilization of the ovules. The fact that the septal glands of the several species still secrete at least a small amount of nectar may, as Riley believes to be the case,* depend upon the indirect utility of this secretion near the base of the flower in drawing insects other than Pronuba away from the stigma; or, as I am inclined to think, it may merely indicate that the abortion of the glands is not yet complete. The glands themselves need not be expected to disappear or to be reduced in size to an extent corresponding with their loss of activity under this latter supposition, for their persistence does not itself imply any drain on the forces of the plant, since they represent mere clefts in the connate walls of the carpels which have united to make the compound Yucca ovary. It is possible, however, that the rather abundant stigmatic secretion is not, as I have supposed, now being reduced from a still more abundant quantity that once served as true nectar, — and this assumption of a former nectariferous function of the stigma would be superfluous if Dr. Lind's theory were correct, —

* l. c. 110

since the Agaves, with an entirely different sort of pollination, possess an equally copious stigmatic secretion.

The Hesperoyuccas, represented by *Whipplei* and its variety, appear to have undergone a greater adaptation to general pollinators than the true Yuccas. Retaining the stylar canal and septal glands of the prototype, they have acquired a capitate stigma through the consolidation of the spreading lobes, the small stigmatic papillæ of other species becoming lengthened as a means of catching pollen adhering to visiting insects. On a few pistils, one of which is represented in the appended figure, the stigma is, in fact, separated into its carpellary



DIALYSIS OF HESPEROYUCCA STIGMA, × 2.

segments, each of which is strongly revolute. Similar instances of dialysis have also been observed in the true Yuccas, and these teratological specimens represent pretty nearly what I suppose to have been the original form of stigma in the ancestors of the Yuccas. The pollen grains may be assumed to have become somewhat viscid as a means of surer attachment to visitors which did not go deliberately to the anthers, and I am inclined to look on their agglutination into crude pollinia as a result of this, — perhaps intensified on the return of the plant to exclusive Pronuba pollination, — rather than an original provision for their bodily removal by other pollinators. These plants may, therefore, have branched off from the earlier Yuccas after a certain dependence on Pronuba had been formed, perhaps

acquiring their more general adaptations because of separation from Prodoxids, and readjusting themselves to their former pollinators on again coming within their reach; and I am disposed to think that this is the case, rather than to assume that the generalization antedates their first association with Pronuba.

The evolution of the Pronubas has presumably gone hand in hand with the adaptation of the Yuccas to their services in pollination, and has been sketched, in its essential features, by Professor Riley. It is interesting to observe that one species, *P. yuccasella*, accompanies the true Yuccas of the most differentiated type across the continent from the south Atlantic states to southern California (and undoubtedly the peninsula), and that, as the pollinator of *Y. baccata*, it occurs in California associated with *P. synthetica* and *P. maculata* and its curious black derivative, which pollinate respectively the archetypal *Y. brevifolia* and the greatly differentiated Hesperoyuccas, thus strengthening the inference that the latter two are primarily Pacific types, while *baccata* in its present form is an immigrant from the East, which has been accompanied by the common pollinator of the eastern species.

In a paper read before the American Association for the Advancement of Science at Rochester, in August, 1892, Professor Smith has shown that the curious tentacles used by the moth in pollinating the Yucca flowers, occupy a position similar to that of the palpifer on the maxillæ of other groups of insects, and so is disposed to homologize them with those parts. As Professor Cope has suggested to me, a fuller knowledge of the embryology of lepidoptera may show the general prevalence of similarly situated processes in the early differentiation of the maxillæ, and thus remove the only valid objection that I see to Professor Smith's conclusions, the isolated occurrence of these appendages in the group of lepidoptera. At present they are known in a developed form only on the females of Pronuba, and as rudiments on the males of that genus and

in the related genus Prodoxus. The occurrence of such rudiments in Prodoxus, however, is very interesting from an evolutionary stand-point, for it points to the inference that these moths are retrogressions from the Pronubas, rather than a nearer approach to the common parents of both.

The three types of fruit on which the primary classification of the true Yuccas rests, correspond with three modes of dissemination in the genus. About half of the recognized species have sweet, edible, pulpy fruits; two have indehiscent fruits similar to the preceding during their early development, but dry at maturity; and the remainder, including nearly one half of the true Yuccas, and the Hesperoyuccas, have dehiscent dry capsules. All of these fruits agree in their type of structure, as might be expected from the general uniformity in the parts of the ovary in the several species. In all of those I have been able to study during their development, the inner part of the ovarian wall, corresponding to the superior face of the infolded carpellary leaves, becomes more or less firm, the walls of its cells being thickened and deeply pitted, while the outer part is green and fleshy, and no doubt takes part in the assimilative work of the plant. In the Sarcoyuccas, this outer part becomes much thickened and quite succulent and sweet toward maturity, assuming a yellowish or purplish color and, in short, undergoing the usual ripening process of baccate fruits. The seeds, meantime, in most of these species, are immediately surrounded and protected by the firm inner layer previously mentioned, which suggests in texture and function the core of an apple, and in which the seeds rattle with considerable noise when the fruit is shaken. The pulp is easily removed from this core, which is usually shaped to the convexity of the thick seeds, so that when denuded it bears quite a strong superficial resemblance to a small ear of corn, a number of interspersed pale and undeveloped seeds, causing a mottling suggestive of

the "squaw corn" of the Indians. In *aloifolia*, where the pulp becomes almost black throughout, the very slight core also at length becomes pulpy. These fruits are well adapted to dissemination by fruit-eating animals, especially birds, the firm core suggesting that the pulp only is swallowed, the seeds being thrown away; but I do not know of any recorded observations on their dissemination.

The Clistoyuccas, with dry indehiscent fruits, comprise the curious tree Yucca of the deserts, *Y. brevifolia*, and a single eastern species, *Y. gloriosa*. Though frequent in cultivation, the latter is one of the least known Yuccas, and its fruit has been observed rarely. All that I can learn of it points to the conclusion that its fruit is of the Sarcoyucca type with rather thin seeds and suppressed development of the exocarp, suggesting a retrogression from *aloifolia;* but nothing can be said as to its dissemination. *Y. brevifolia*, however, differs from all of the other known species in having a very thick exocarp, corresponding to the pulp of the preceding group, but dry and spongy at maturity. The fruits of this species fall quickly after ripening, either by a distinct disarticulation or because of the brittleness of the pericarp at base, and their rounded form and very light specific gravity render them well developed "tumble fruits," and point to their dissemination over the dry sands of the desert by aid of the strong winds which prevail there, the seeds being liberated ultimately by the breaking of the fragile pericarp. Although *brevifolia* appears to be the least advanced of the Yuccas in its general development, I am disposed to look on this adaptation of its fruit to wind dissemination as a special acquisition, rather than regard it as representing the original type of Yucca fruit; yet, so far as the facts are known, it might equally well be held to be an advance on an earlier unspecialized fruit, or a retrogression from the baccate type.

In the capsular species, the green exocarp dries down to a rather thin layer at maturity, and the core, with this adherent film, dehisces through the true septa, and, for a

certain distance from the top, through the backs of the several carpels (Pl. 22). The seeds of all of these species are thin and flat and the capsules are erect, so that the adaptation to the scattering of the former, a few at a time, by gusts of wind, is that usual in capsular fruits of this kind. It is interesting to note that *Whipplei* and its variety, representing the aberrant group of Hesperoyuccas, possess the thin margined seeds of the capsular true Yuccas, but the capsules dehisce to the base in a loculicidal manner, that is, through the false partitions, the tough core-like tissue of which is arranged in a transverse lace-like structure (Pl. 23). Though dissemination depends on the wind in both cases, the seeds of the capsular true yuccas are lifted out of the pods by the wind dipping into the opened top of the cells, while in Hesperoyucca they are removed by puffs of air entering at the side through the lace work across the deep lateral clefts, in the manner beautifully described for *Lilium* in an anonymous article in the Bulletin of the Torrey Botanical Club, i. p. 46, and well known in the basket fruits of some Aristolochias, etc.

EXPLANATION OF PLATES ILLUSTRATING YUCCAS AND THEIR POLLINATION.

Plates 1–2, *Y. Guatemalensis*, flowering and fruiting plant at the Garden.

Plate 3, *Y. Schottii*, near Benson, Arizona.

Plate 4, *Y. australis*, near Sierra Blanca, Texas.

Plate 5, *Y. australis*, — a specimen from the same region, cultivated at the Garden.

Plates 6–9, *Y. brevifolia*, about Hesperia, California.

Plate 10, *Y. elata*, near Benson, Arizona.

Plate 15, *Y. elata*, descending axis, two and a half years from the seed, one-half size, — the principal growth made in the season when figured, (after Engelmann). — *Y. filamentosa*, germination, ×2.

Plate 16, *Hesperoyucca Whipplei*, at Summit, California.

Plate 17, *H. Whipplei*, var. *graminifolia*, at Arrowhead Springs, Cal.

Plate 18, *Y. aloifolia*. — 1, Flower, natural size; 2, pistil and stamens, ×2; 3, sections of pistil at points marked by dotted lines, × 2. *Y. Treculeana*. — 4, flower, natural size (after a drawing by Mrs. H. J. Webber); 5, pistil and cross sections, ×2.

Plate 19, *Y. Guatemalensis*. — 1, Flower, natural size; 2, pistil and stamens, ×2; 3, sections of pistil at points marked, ×2; 4, fully grown but green fruit, natural size; 5, seed, ×2.

Plate 20, *Y. baccata*.— 1, Flower, natural size; 2, pistil and exceptionally long stamens, natural size; 3, pistil (the upper part in longitudinal section), and cross sections, ×2; 4, enlarging ovary, showing Pronuba punctures, natural size; 5, cluster of fruits, perforated by escaping Pronuba larvæ (after a photograph taken near San Diego, Cal., by Parker and Parker), reduced.

Plate 21, *Y. brevifolia*. — 1, Flower, at time of pollination, natural size; 2, pistil in longitudinal section, and cross sections at points marked, ×2; 3, *Pronuba synthetica*, ×3; 4, oviposition of moth, natural size; 5, head of laden ♀, ×10; 6, young larvæ in developing fruit, reduced one-half; 7, ripened but rather small fruit, from which the larvae have escaped, natural size.

Plate 22, *Y. filamentosa*.—1, Flower, natural size. *Y. elata*.—2, pistil and stamens, and cross sections of pistil, ×2; 3, dehiscent capsule, perforated by escaping larvæ, natural size. *Y. glauca*, var. *stricta*.—4, pistil and stamens, and cross sections of pistil, ×2. 5, *Pronuba yuccasella*, ×3.

Plate 23, *Pronuba maculata*, var. *aterrima*. — 1, Laden ♀, ×3; 2, head of same, ×10. *Pronuba maculata*. — 3, laden ♀, ×3, and venation of wings; 4, pollination. *Hesperoyucca Whipplei*. — 5, flower, natural size; 6, longitudinal section of pistil, and cross sections at points marked, ×2; 7, stamen, adnate to base of petal, ×2; 8, section of ovary punctured in oviposition, ×2; 9, small capsule, dehiscent through the false septa, natural size.

Unless otherwise stated, the plates were drawn by Miss Johnson, from photographs or studies by the author, or are reproductions of photographs.

Since the preceding pages were electrotyped, the paper by Professor J. B. Smith, on the maxillary tentacles of Pronuba, referred to on p. 222, has been printed in Insect Life, v. 161, Jan. 1893.

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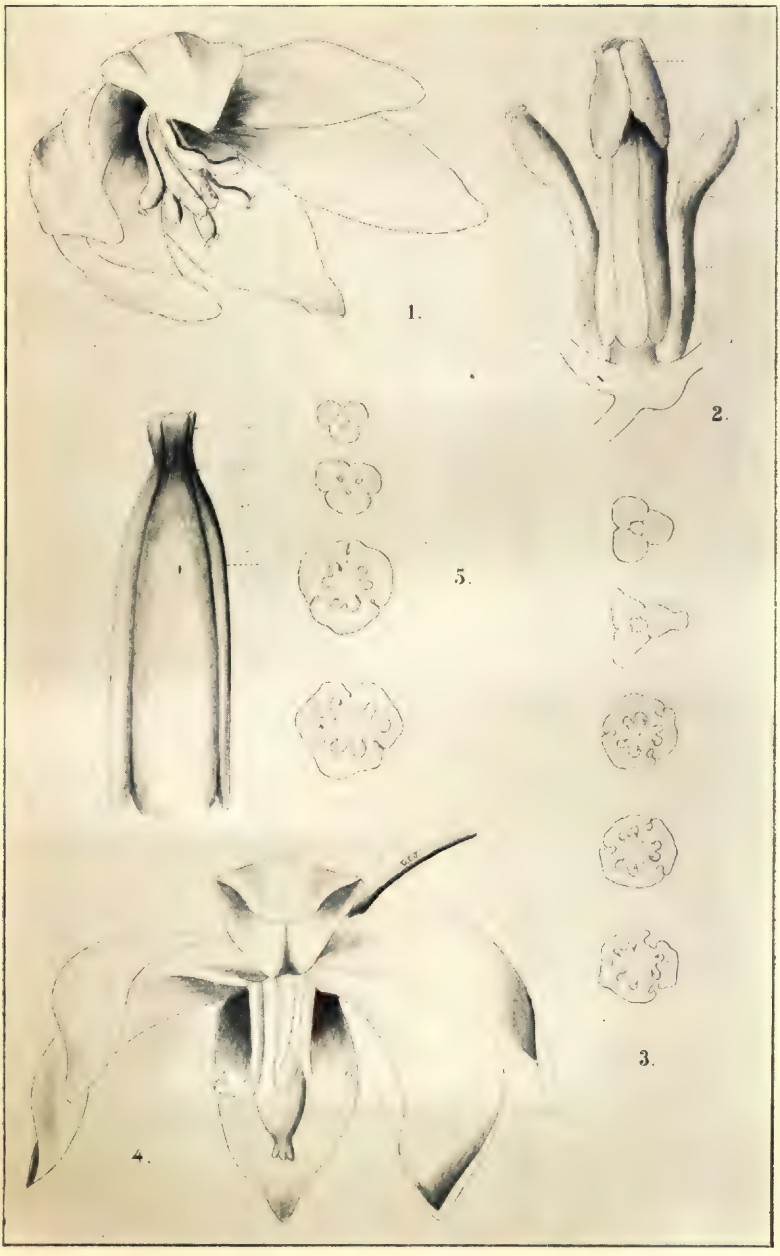

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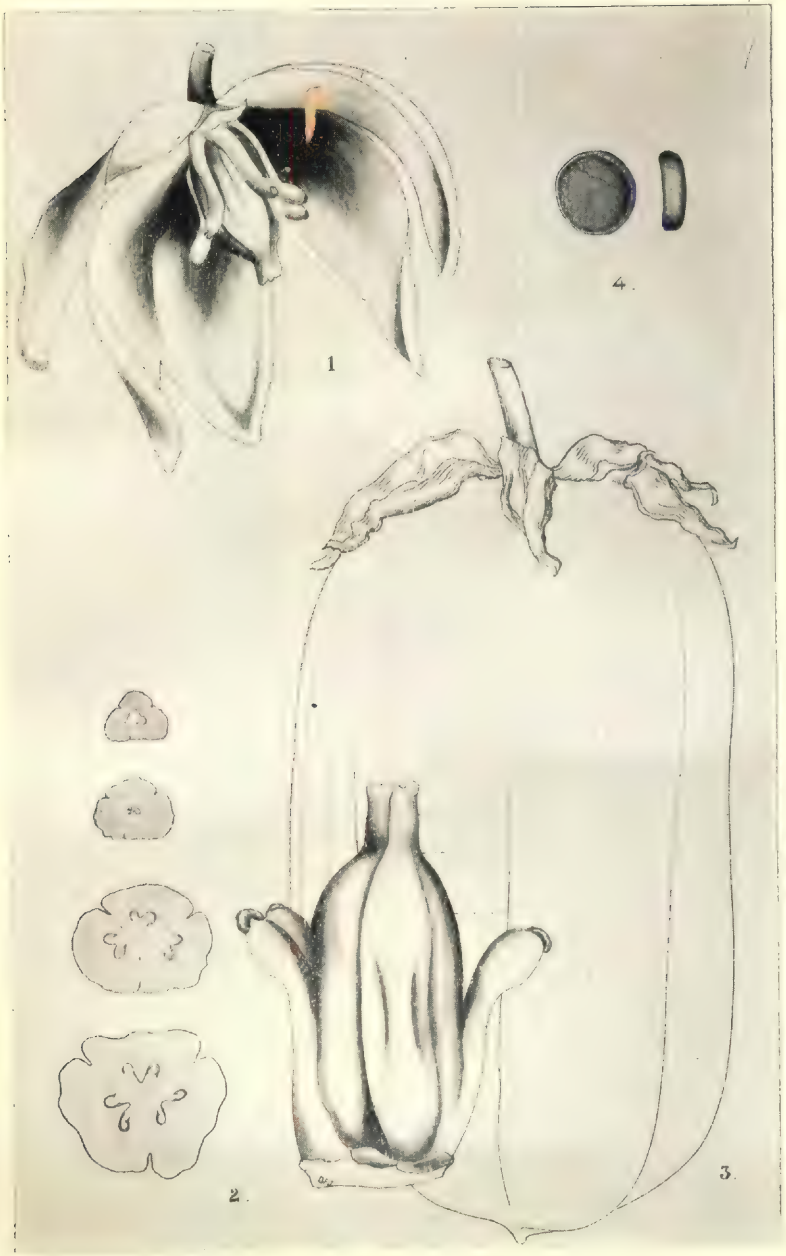

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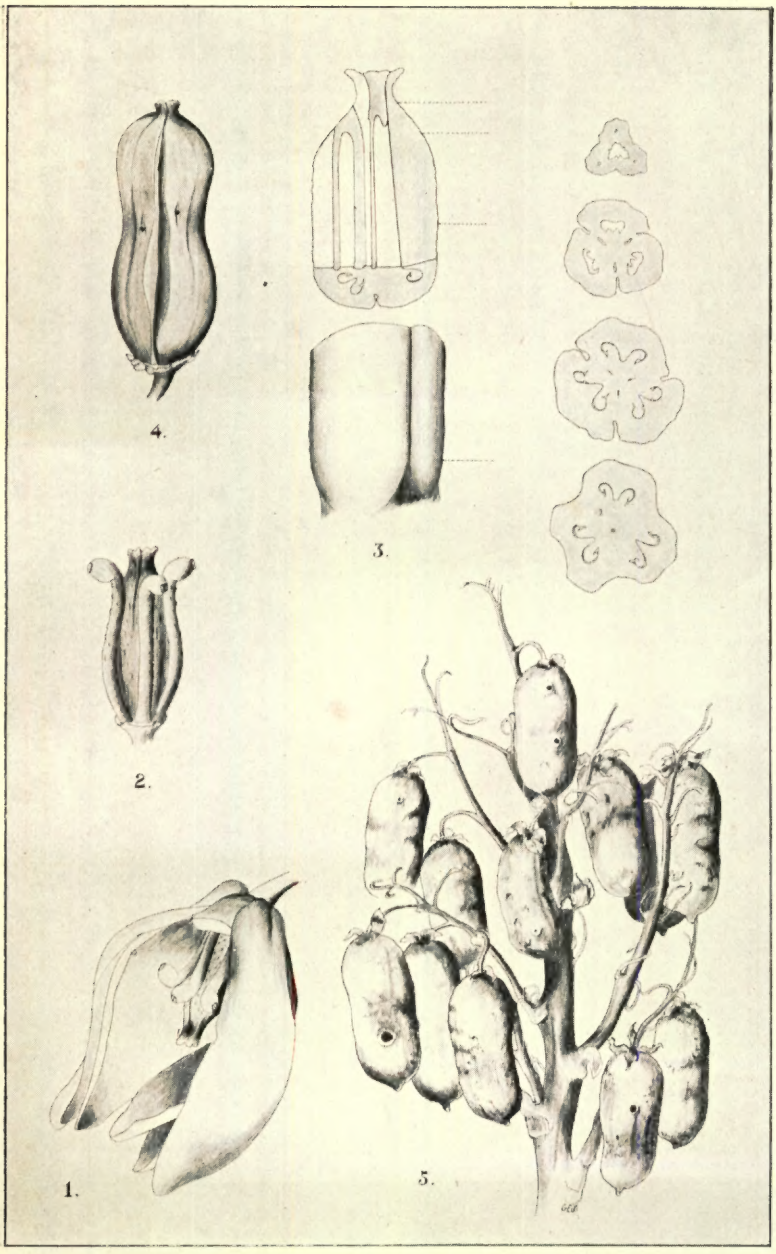

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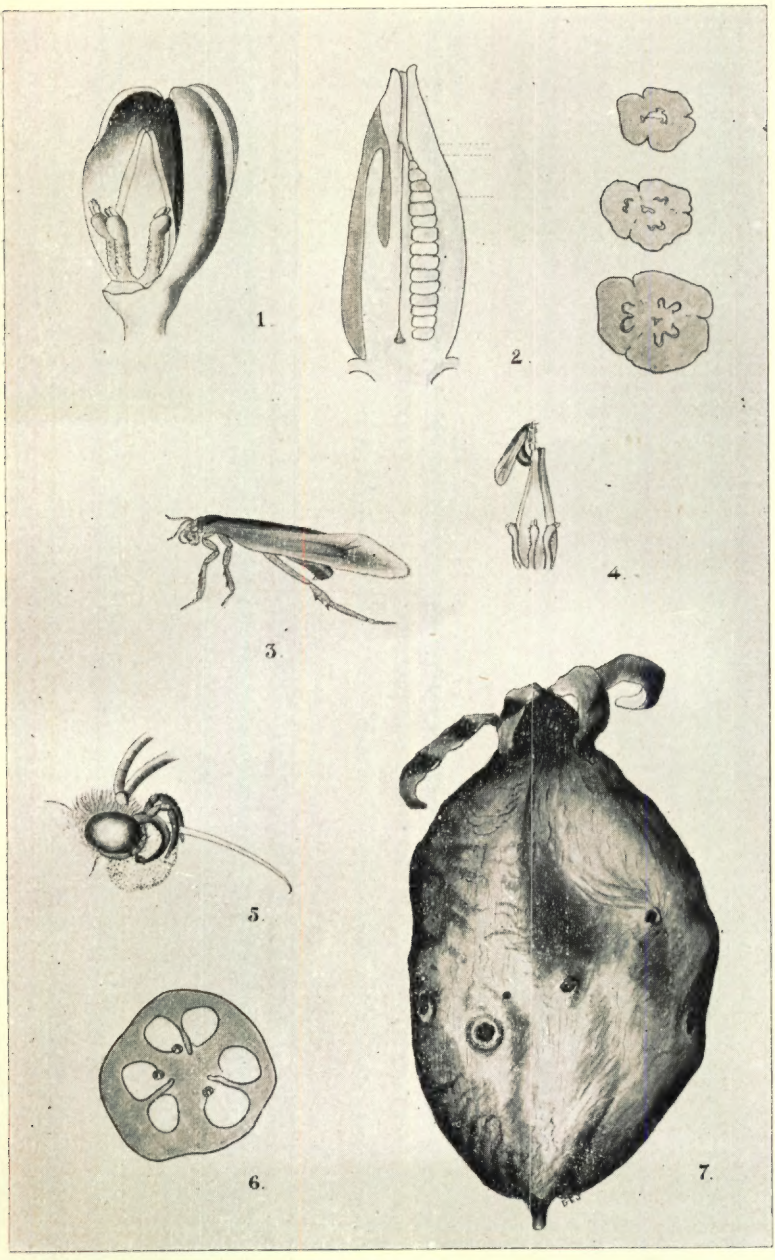

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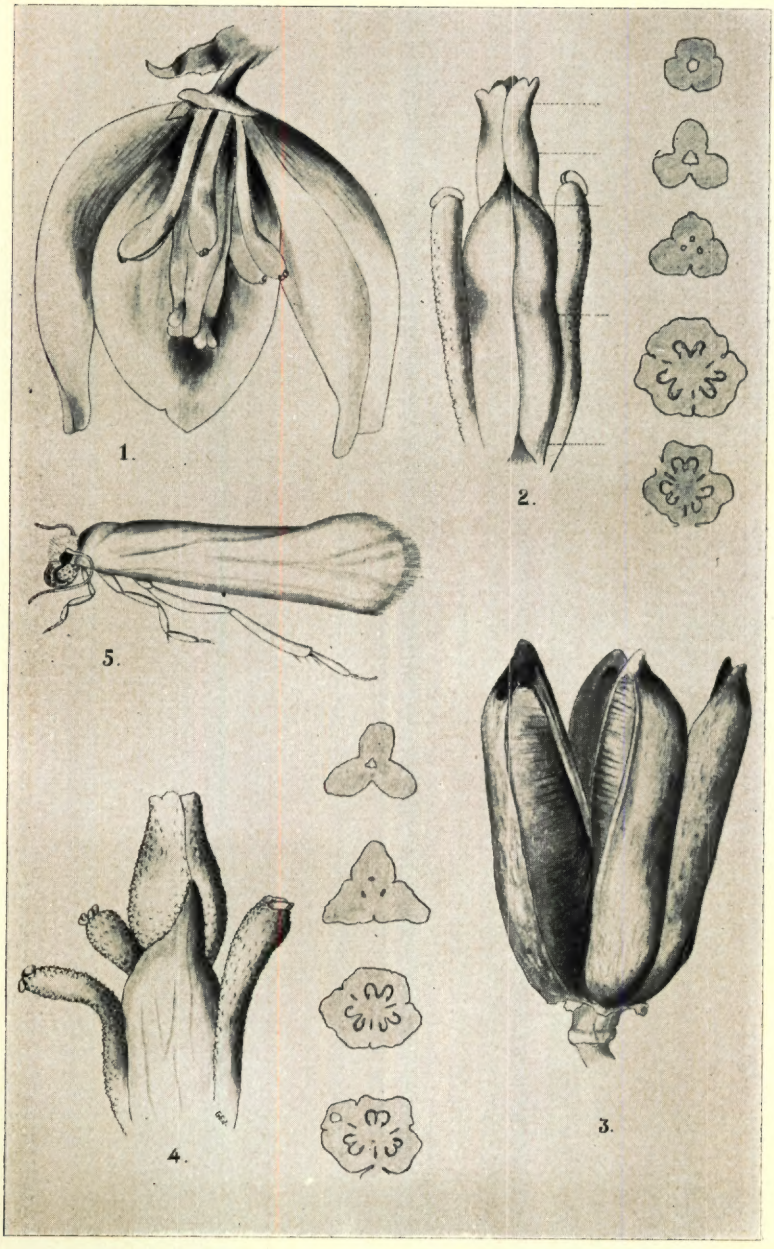
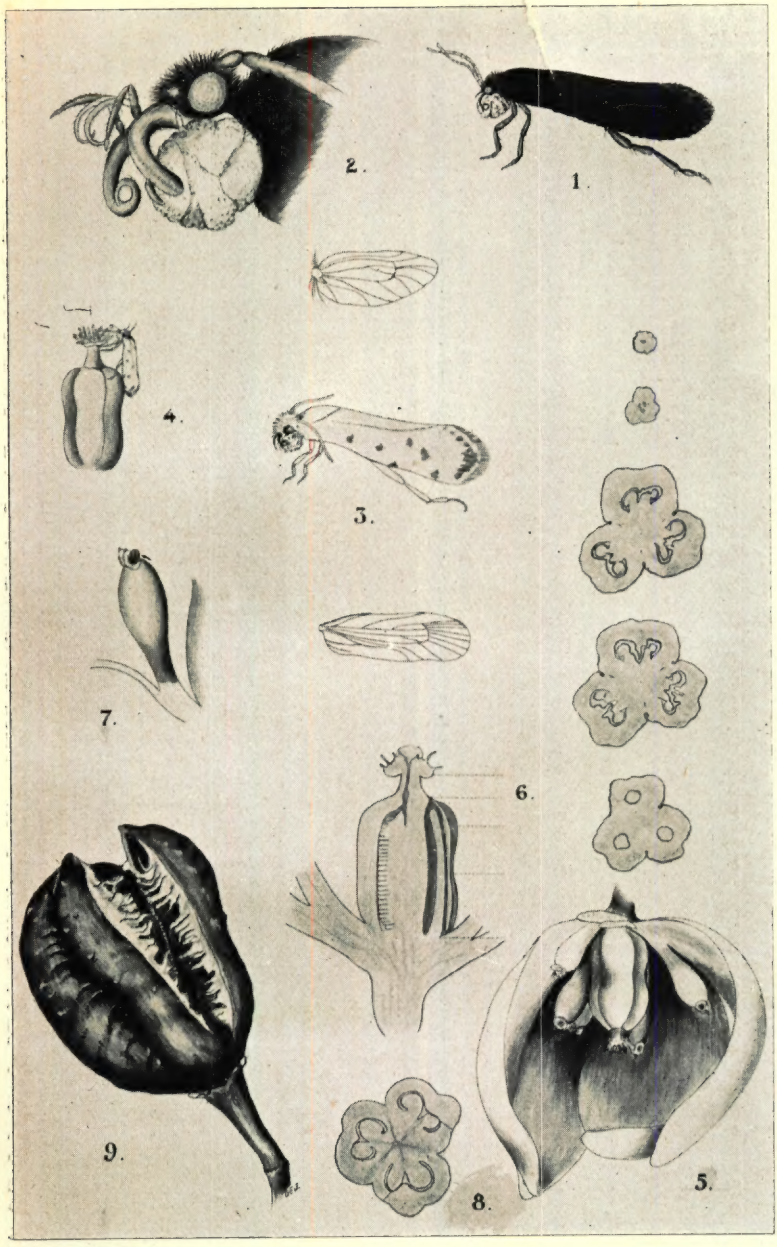


YUCCA, § CHAENOYUCCA.



HESPEROYUCCA WHIPPLEI, AND VARIETY.